TELEPRINTER

TX 20

FIELD MAINTENANCE MANUAL

TECHNICAL DESCRIPTION

MAINTENANCE MANUAL

ILLUSTRATED CATALOGUE

SAGEM

FOREWORD

This Teleprinter model TX 20 FIELD MAINTENANCE MANUAL is divided into three parts :

1 - Technical description
2 - Maintenance manual
3 - Illustrated catalogue.

NOTE

This document cancels and replaces the FIELD MAINTENANCE MANUAL SA 11381

1

TECHNICAL DESCRIPTION

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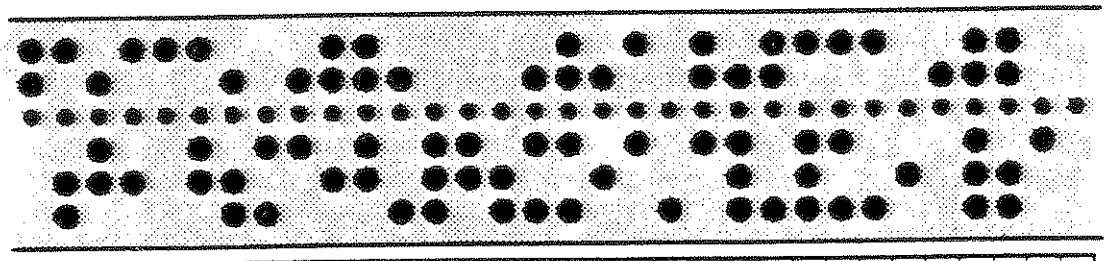
GENERAL

The teleprinter is designed to interface with a communications network. It is an electronic device the control logic of which is organized around a microprocessor.

TECHNICAL SPECIFICATIONS

- Code No 2 CCITT



LETTERS A...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	<	↕	A...	1...	→	⊖
FIGURES 1...	-	?	:	*	3	X	X	X	8	☎	(	)	.	,	9	0	1	4	'	5	7	=	2	/	6	+						
Combinations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

In FIGURES position, combinations 6, 7 and 8 are reserved for national or private use.

<	Carriage return
↕	Line feed
A...	LETTERS shift
1...	FIGURES shift

→	Space
*	«Who are you ? »
☎	Sound signal
⊖	32nd (no punch)

NOTE : "LETTERS" symbol may be represented by "A..." or "⊕".

- ADAPTATION TO A TELEGRAPHIC WAY

  . Indicating : type A, type B, ...

  . Numbering : keyboard selection.

  . Telegraph speed : 50, 75 or 100 Bd
  Selector switch located on "ADAPTATION" board.

  . Telegraphic qualities:

  . overall "start-stop" distortion : < 2 %
  for any "ADAPTATION" board without psophometric filter,

  . effective net margin : ⩾ 42 %

  . rejects "start" polarity pulses with a duration of half an unit-element or less.

- Adaptation device (incorporated in the unit) : - signal output current injector,
  - signal input current regulator.

- KEYBOARD

  . operating principle : - electronic,
  - automatic "LETTERS-FIGURES" shift.

  . key layout : - QWERTY,
  - extended,
  - stepped.

  . use : two-key roll-over or N-key roll-over. The roll-over selector switch is located on the "CLAVIER" board.

- Programmed tabulation

- TAPE READER

  . reading speed : 6.66 - 10 - 13.33 - 15 cps depending on the unit operating mode.

  . tape : - 5 channels,
  - 17.5 mm wide.

- TAPE PUNCH

  . punching speed : 6.66 - 10 - 13.33 - 15 cps depending on the unit operating mode.

  . tape : - 5 channels,
  - 17.5 mm wide.

- PRINTER

  . character set : see PRINTER paragraph.

  . character definition : impact mosaïc printing on 7 lines and (5 + 4) columns.

. character size :
  . height : 2.7 mm.
  . width : 1.8 mm.

. number of printed characters/line : 69.

. character step : 2.54 mm (10 characters per inch).

. line spacing :
  . single line feed : 4.2 mm (1/6").
  . double line feed : 8.4 mm (1/3").
  Single and double line feed switch is located on the "PERSONNALISATION" board.

. printing speed :
  . off-line : 15 c/s.
  . on-line : according to unit operating mode

. minimum new line sequence : 1 character "carriage return" + 1 character "line feed".

. audible alarm for near-end of line : at 60 th character.

. paper drive : friction.

. paper : 210 mm or 216 mm wide roll with 130 mm maximum diameter

. maximum number of copies : 1 original + 3 copies (with carbon paper).

. alarm message text for paper out, tape out or unavailable unit

. ink ribbon : SAGEM.

. DUAL FUNCTION mode : preparation of a message on tape at the time of simultaneous transmission or reception of another message.

- Operation mode selection

(the control switches are located on the "PERSONNALISATION" board).

. for the operator :
  - with or without TAPE PUNCH operation at time of calling signal reception,
  - text with single or double line feed,
  - delay for text release after printing of a character : . 250 ms
    . 750 ms

. for maintenance technician : - half-duplex or full-duplex,

- with or without answer-back code exchange when communication is established,
- transient or permanent sound alarm signal,
- with or without answer-back code remote control by FIGURES D sequence,
- numbering by teleprinter signals or call dial pulses,
- with or without number 4 combination punching in "FIGURES" shift (FIGURES D),
- single or double current transmission

- Mains power supply : 115 V - 127 V - 220 V - 240 V ± 10 % 50 Hz or 60 Hz ± 2 Hz.

- Power consumption : 110 VA.

- Dimensions :

. width : 515 mm approx (without chad drawer),

. length : 620 mm approx,

. height : 220 mm approx (without page paper).

- Weight : 25 kg approx.

- Ambient conditions :

. operating temperature range : 0°C to + 45°C.

. storage temperature : - 30°C to + 70°C.

- Interference suppression : according to standard VDE 0875 level K (conduction).

TIONS.

COVER COLOR.

KEYBOARD.

. All types, different from AZERTY or QWERTY.

New line sequence.

. Automatic "carriage return + line feed + carriage return" sequence.

National use characters.

ABBREVIATED NUMBERING.

. The system enables the operator to store ten subscriber numerals of his choice. The transmission of one of the numbers is then obtained by pressing a single key on the KEYBOARD.

AUTOMATIC END OF MESSAGE.

. This tape reader facility automatically stops the tape after a message has been completed.

TAPE READER remote control :

. start is controlled by reception of the "LLLL" sequence,

. stop is controlled by the reception of four preselected characters.

Tight tape device (TAPE READER).

. This device stops the reading of the punched tape when it is pulled abnormally in its running direction.

Delayed starting of ANSWER-BACK UNIT.

TAPE PUNCH remote control :

. start TAPE PUNCH upon identification of a "CCCC" or ":::" sequence,

. stop TAPE PUNCH upon identification of a "FFFF" sequence.

- Sprocket paper drive with "CAROLL" type perforated margins.

  . Number of printable characters per line : 80.

- Alarm message text.

- Modulation speed remote control :

  . either by external wire,

  . or by character sequence.

- Primary and secondary TRANSFORMER voltages.

- Reception way cut-off detection device.

  . NOTE : This device is used in double current, or single current with "mark" current.

- "ADAPTATION" board.

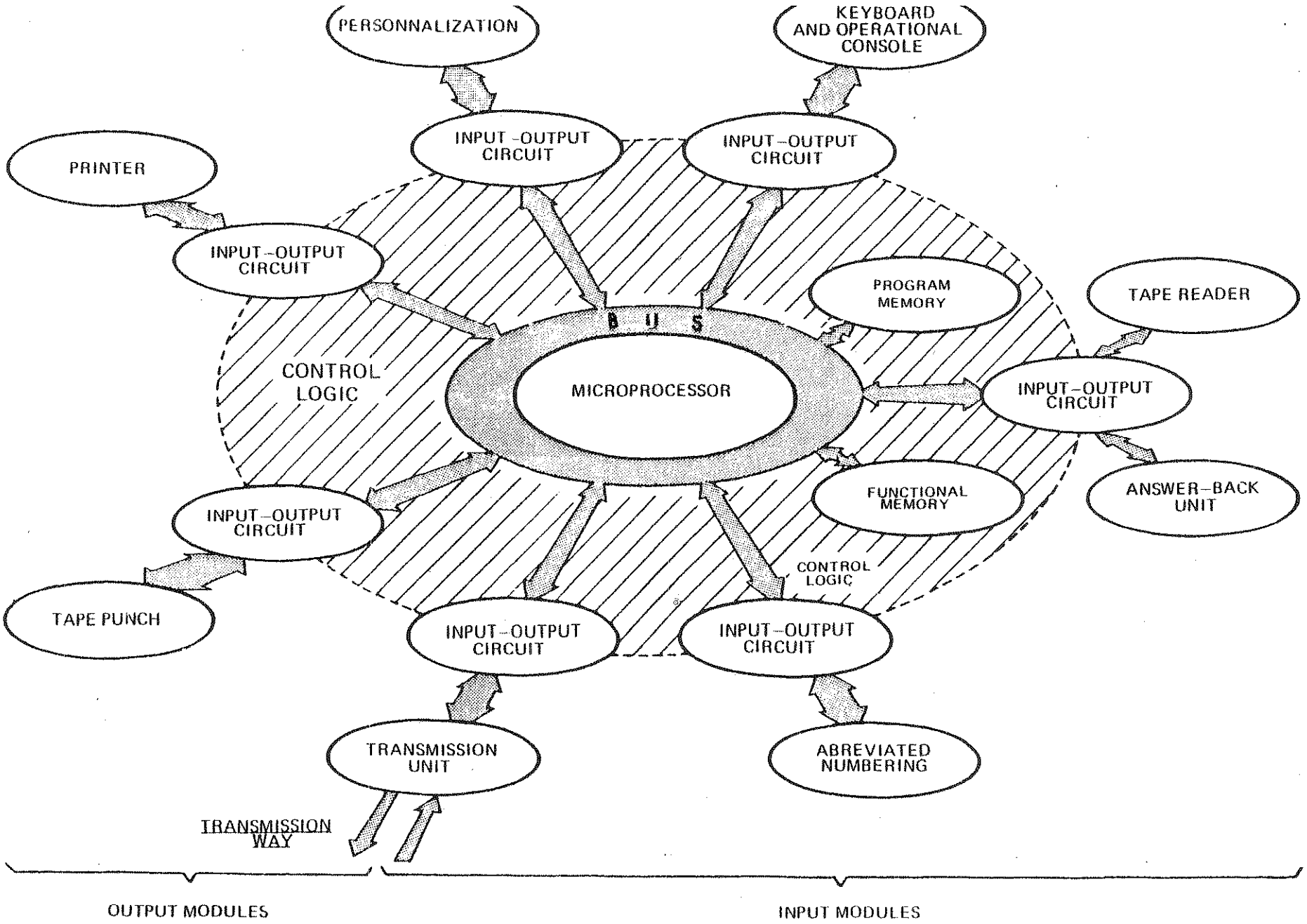
  . Depending on transmission way being used.

- LIGHTNING ARRESTOR. ("PARAFOUDRE" board)

  . Protects the unit against lightning and mains surges.

- LINE PROTECTION.

  . Protects the unit against overvoltage on the transmission line.


PERSONNALIZATION
KEYBOARD AND OPERATIONAL CONSOLE
INPUT-OUTPUT CIRCUIT
INPUT-OUTPUT CIRCUIT
PRINTER
INPUT-OUTPUT CIRCUIT
PROGRAM MEMORY
TAPE READER
BUS
CONTROL LOGIC
MICROPROCESSOR
INPUT-OUTPUT CIRCUIT
FUNCTIONAL MEMORY
ANSWER-BACK UNIT
INPUT-OUTPUT CIRCUIT
CONTROL LOGIC
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INPUT-OUTPUT CIRCUIT
INPUT-OUTPUT CIRCUIT
TRANSMISSION UNIT
ABREVIATED NUMBERING
TRANSMISSION WAY
OUTPUT MODULES
INPUT MODULES

GENERAL ORGANIZATION

The teleprinter can be considered as a data micro-system consisting of a microprocessor with program and functional memories which interfaces with a certain number of peripherals through input-output circuits :

- signalling and control module :
  . OPERATIONAL CONSOLE.
- input modules :
  . KEYBOARD,
  . TAPE READER,
  . ANSWER-BACK UNIT,
  . TRANSMISSION DEVICE (transmission input-output circuit).
- output modules :
  . TAPE PUNCH,
  . PRINTER,
  . TRANSMISSION DEVICE (reception input-output circuit).

Each module interfaces with the "Bus" through an input-output circuit. The function of the microprocessor is to scan the "Bus" condition and to ensure, as a function of various conditions, data transfer and control sequences between the modules. Data exchanged between these peripheral modules and control logic are as follows :

- condition data from the modules to the control logic,
- control data from the control logic to the modules,
- data from the input modules to control logic and from control logic to the output modules.

Each "Hardware" module has an associated "Software" module contained in the program memory.

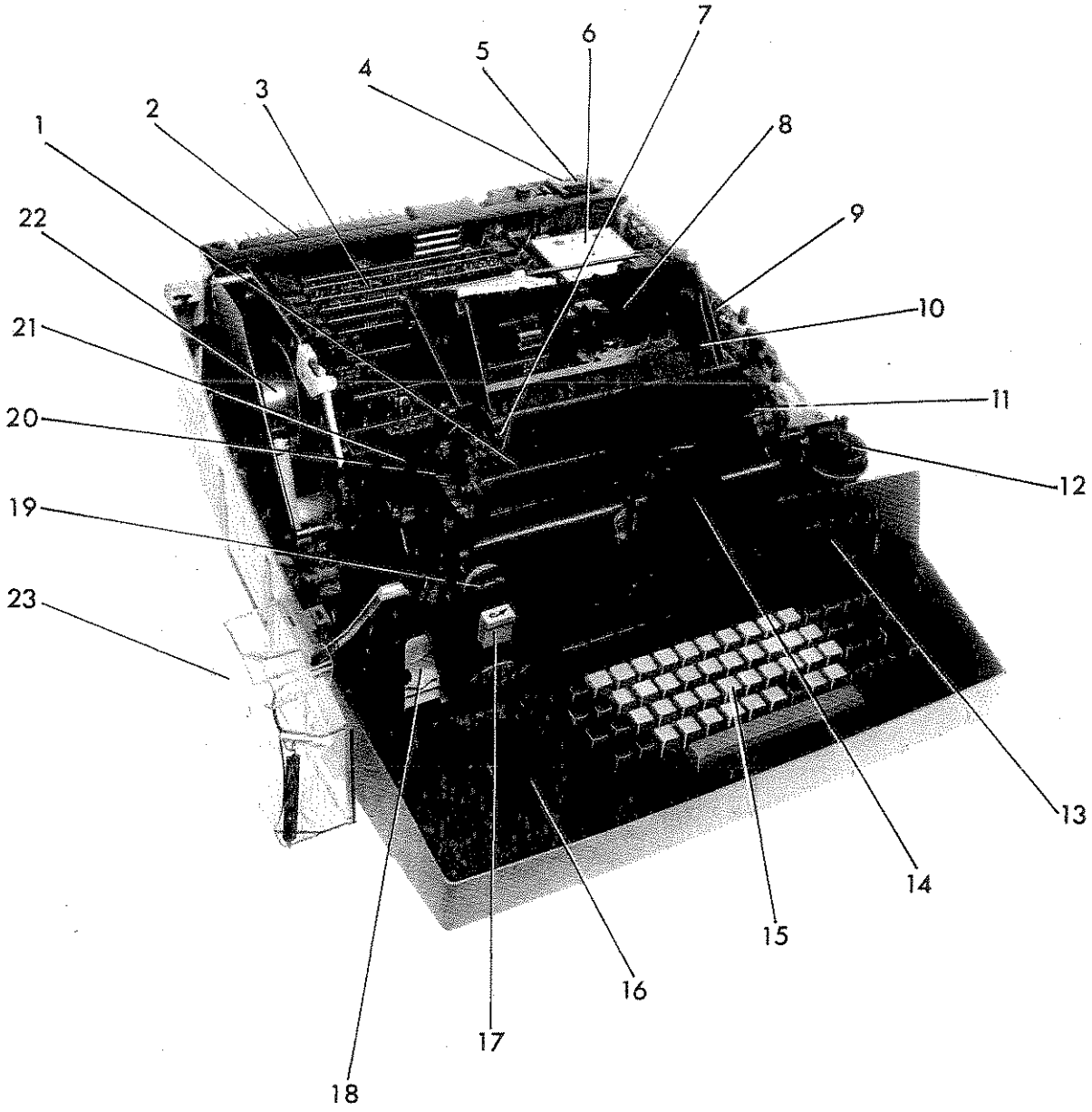
DESCRIPTION

The unit is designed so that a maximum of functions are carried out electronically. The unit flowchart is functional and modular. The unit consists of the following modules :

- OPERATIONAL CONSOLE (13),
- KEYBOARD (15),
- ANSWER-BACK UNIT (on "PIA LECTEUR + AMPLI" board),
- TAPE READER (16),
- TAPE PUNCH (18),
- PUNCH BACK SPACER (TAPE PUNCH) (17),
- TAPE STORE (22),
- CHAD BOX (23),
- PRINTER, basically comprising the following modules :
  . PRINTING DEVICE (14),
  . SENSOR (19),
  . DRIVE MOTOR (20),
  . PAPER ADVANCE (10),
  . PRESSURE ROLLERS (7),
  . PLATEN (1),
  . LINE FEED MOTOR (11),
  . LH RIBBON (21),
  . RH RIBBON (12),
- POWER AMPLIFIER (2),
- TRANSFORMER (6),
- $\pm$ 12 V POWER SUPPLY (8),
- LIGHTNING ARRESTOR (5) ("PARAFOUDRE"),
- MAINS CABLE (not shown),
- MAINS FILTER (4),
- "ADAPTATION" board (9),
- Electronic boards rack (3) containing the followings :
  . "ALIMENTATION" board,
  . "ASSERVISSEMENT" board,
  . "PIA IMP" board,
  . "PIA ERD + IT/ADA" board,
  . "PIA LECTEUR + AMPLI" board,
  . "PIA CLAVIER + MPU" board,

. "RAM + RPROM" board,
. "PIA PERFO + AMPLI" board,
. "NUMEROTATION ABREGEE" (abbreviated numbering) board,
. "PERSONNALISATION" board.

All these modules are readily replaceable.



OPERATIONAL CONSOLE

Function

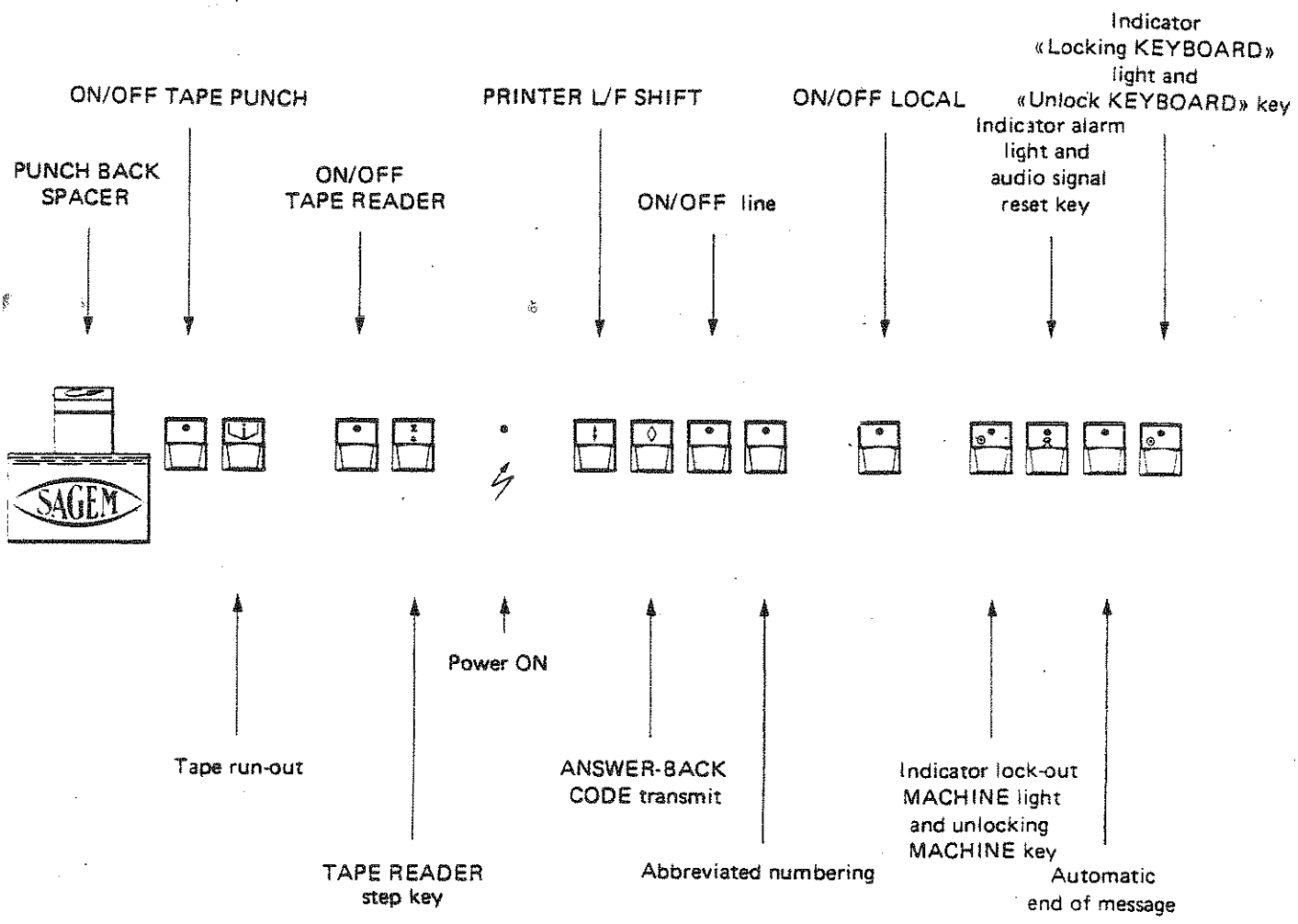
Control keys are provided for placing the unit in the desired configuration.

These are interfaced in the same way as the KEYBOARD keys. Indicator LEDS indicate the unit configuration signalling.

Description

The OPERATIONAL CONSOLE consists of :

- a set of 14 keys*,
- a set of 10 indicator light emitting diodes.*



* NOTE : The number of keys and indicator lights may vary, according to the type of unit.

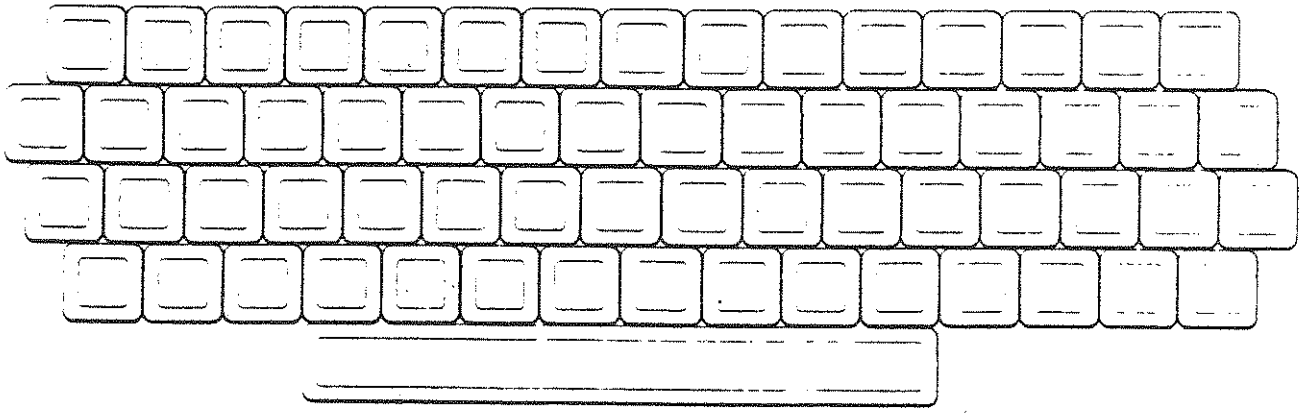
KEYBOARD

Function

When the operator depresses a key, the KEYBOARD supplies the corresponding five code elements of the No 2 CCITT alphabet.

Keyboard layout

Many different layouts and key engravings are available.

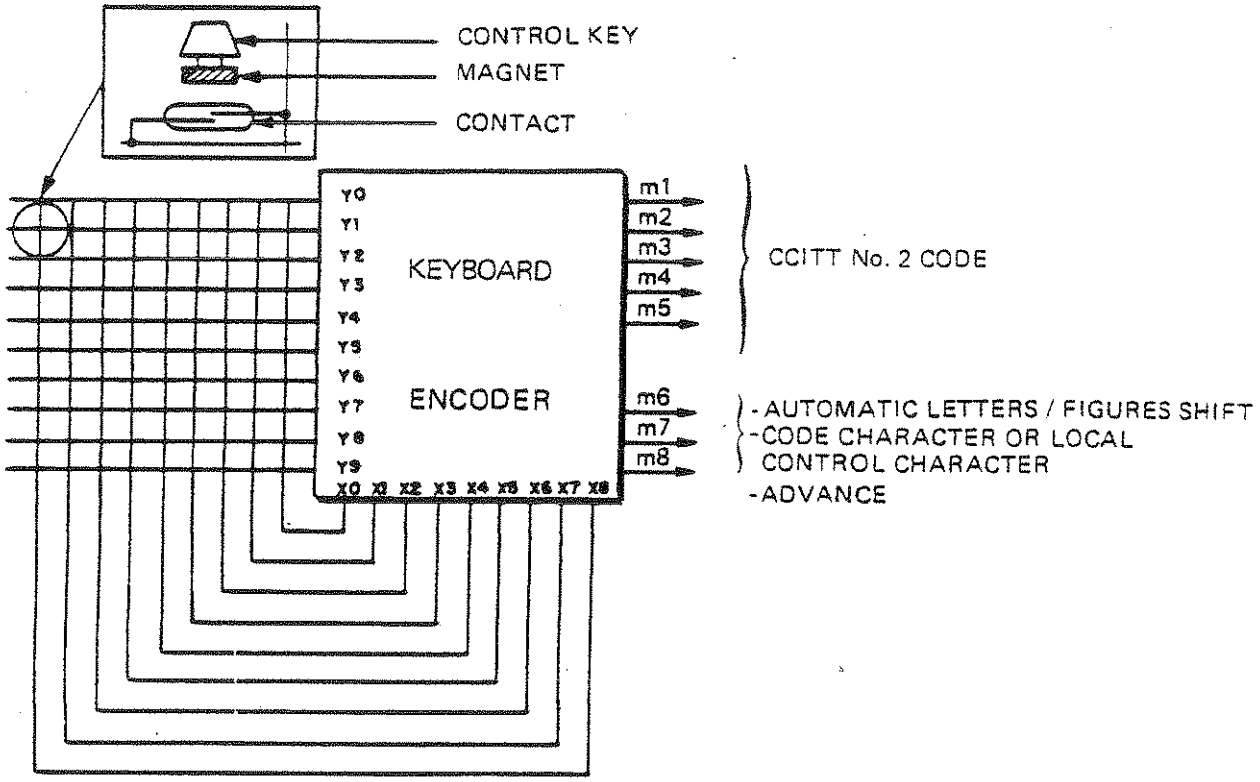


Usually, the KEYBOARD comprises the whole of No 2 CCITT code characters.

Description

The KEYBOARD is of the extended type mainly comprising :

- a set of dust-tight reed contact keys,
- a KEYBOARD encoder



ANSWER-BACK UNIT

The answer-back code is contained in a plug-in memory located on PIA LECTEUR + AMPLI" board.

The answer-back code change is accomplished simply by replacement of the plug-in memory.

NOTE : The ANSWER-BACK UNIT memory is programmed using the programmer EMP 5.

TAPE READER

Function

The TAPE READER allows automatic transmission of the characters recorded on punched tape.

Description

The TAPE READER consists of a tape drive device and a character reading device.

The tape drive device consists of a sprocket wheel driven by two gears, one which is attached to a stepping motor.

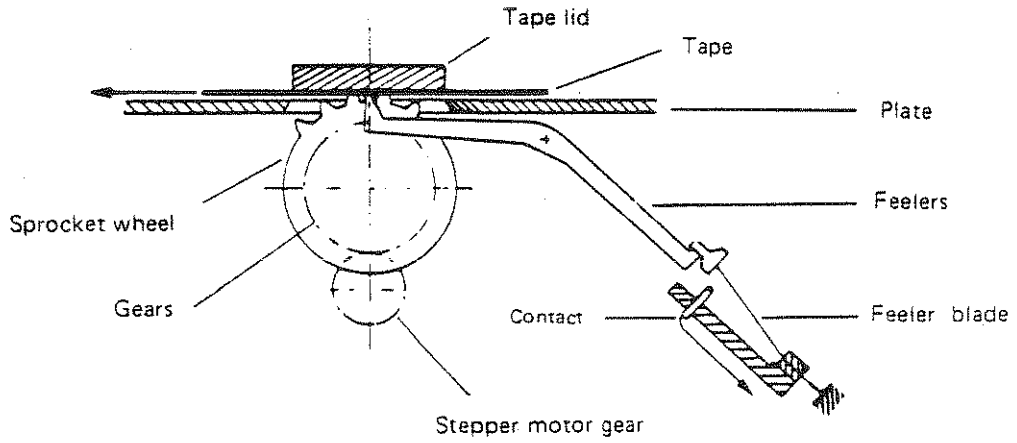
The character reading device consists of five feelers, each of which are associated with a contact operating as follows :

- hole ⟶ closed contact,
- no hole ⟶ open contact.

The punched tape is pressed against the plate by a tape lid.

Presence of the tape is signalled by the "tape out" feeler as follows :

- tape in ⟶ open contact,
- tape out ⟶ closed contact.



TAPE PUNCH

Function

The TAPE PUNCH is used to record characters on punched tape.

Description

The TAPE PUNCH consists of drive, guidance and electromechanical punching devices.

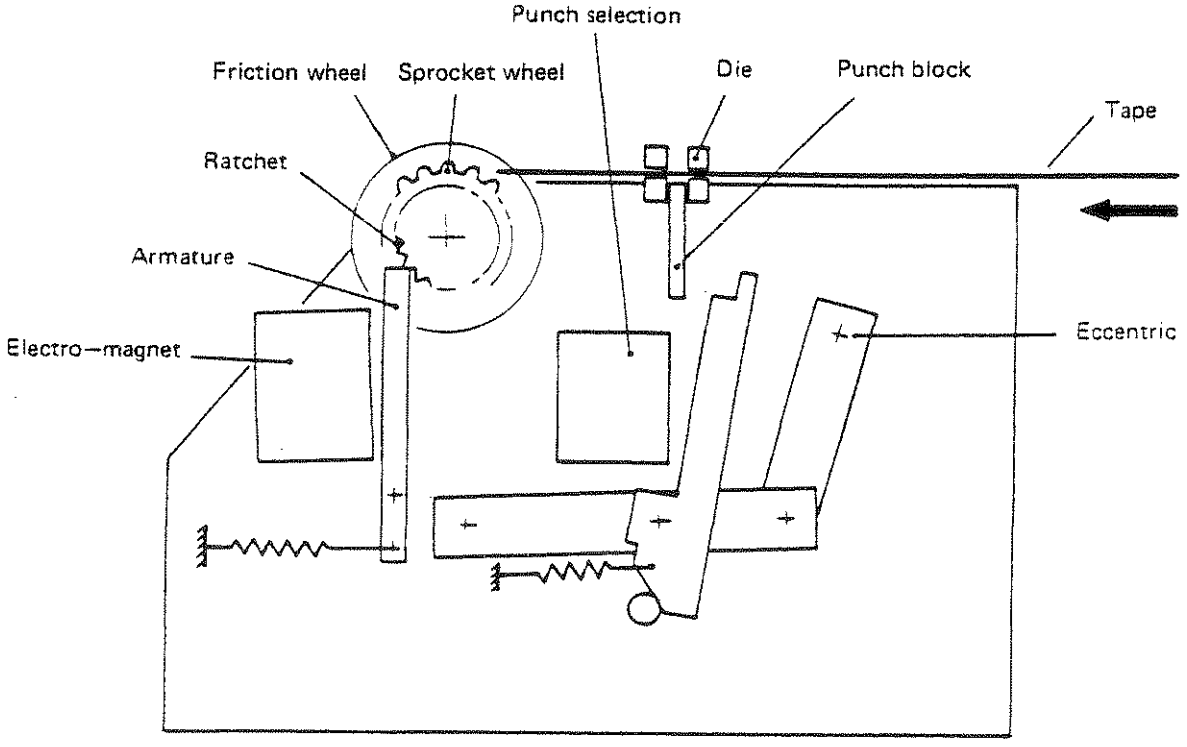
Tape drive is provided by a sprocket wheel integral with a ratchet wheel, forming one of the two friction plates. The other one is driven by a notch-belt, itself driven by a DC motor. The armature of an electromagnet holds back, or releases, the ratchet as a function of the current applied to it.

Tape guidance is provided by a guide equipped with a presser and a tension reducer device.

Electromechanical punching is carried out by means of the following equipment :

- punch and die block,
- eccentric,
- punch selection system,
- punch return system.

NOTE : A TAPE STORE and chad drawer are fitted to the TAPE PUNCH. The TAPE STORE is equipped with a tape out switch.



PRINTER

Function

The PRINTER is used to write messages on standard paper. The type of message, whether prepared locally, transmitted or received, can be distinguished by a different style of writing :

A LOCALLY PREPARED MESSAGE IS PRINTED IN CHARACTERS
SLANTING TO THE LEFT
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

A TRANSMITTED MESSAGE IS PRINTED IN CHARACTERS
SLANTING TO THE RIGHT
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

A RECEIVED MESSAGE IS PRINTED IN UPRIGHT CHARACTERS
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

This procedure indicates the type of message either on the original or the copies.

Description

The PRINTER consists of :

- a needle type PRINTING DEVICE assembled on a carriage,
- a carriage advance and return to line beginning system including :
  . the SENSOR,
  . the DRIVE MOTOR,
- PAPER ADVANCE,
- PRESSURE ROLLERS,
- a line feed control device including :
  . the LINE FEED MOTOR,
  . the PLATEN,
- a control device for ink ribbon advance and reverse feed comprising :
  . LEFT-HAND RIBBON module,
  . RIGHT-HAND RIBBON module.

PRINTING DEVICE

Function

The characters are printed according to a "mosaïc" type character definition of 7 lines and (5 + 4) columns. A set of points is used to form each character as shown in the table on next page. Printing is carried out by impact through the ink ribbon.

Description

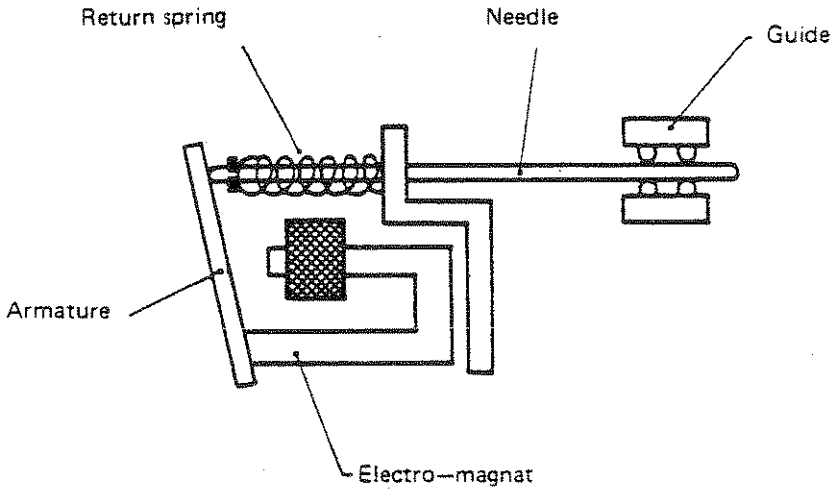
The PRINTING DEVICE comprises :

- 7 needles fitted in a guide,
- 7 electromagnets with armatures,
- 7 return springs.

Needle movement control is provided by an appropriate sequence delivered by the "PIA IMP" board. The 7 needles are returned by springs at control's end.

A knurl-knob adjusts the distance between the PRINTING DEVICE and the paper.

The adjustment depends on the number of copies and on the paper used.



CHARACTER SET

MOTIONS →					LETTERS				FIGURES			
					0	0	1	1	0	0	1	1
					0	1	0	1	0	1	0	1
5	4	3	2	1	columns / lines							
		0	0	0	0			T	Q			5	9
		0	0	1	1	E	D	Z	B	J	#	+	?
		0	1	0	2		R	L	G		4	'	⊠
		0	1	1	3	A	J	W		—	&	2	
		1	0	0	4		N	H	M		"	⊠	"
		1	0	1	5	S	F	Y	X	'	⊠	6	/
		1	1	0	6	I	C	P	V	8	:	0	=
		1	1	1	7	U	K	Q		7	(	1	

⊠ Reserved for characters intended for national use.

CARRIAGE ADVANCE AND RETURN-TO-BEGINNING OF LINE SYSTEM

. SENSOR

The SENSOR is mechanically coupled to the DRIVE MOTOR shaft and supplies the following signals :

- control of PRINTING DEVICE as a function of its position,
- control of DRIVE MOTOR as a function of instructions sent to the PRINTING DEVICE :
  - . movement direction,
  - . movement speed,
  - . position.

From these signals, the associated electronic unit corrects the orders issued so that the movements of the PRINTING DEVICE are in conformity with pre-established profiles.

The information transmitted by the drive unit to the PRINTER control logic is a follows :

"Character" (CAR)

This signal gives a transition each time the PRINTING DEVICE meets a stop position on the line.

"Column" (COL)

This signal gives a transition each time the PRINTING DEVICE meets a control position.

"Direction" (Sens)

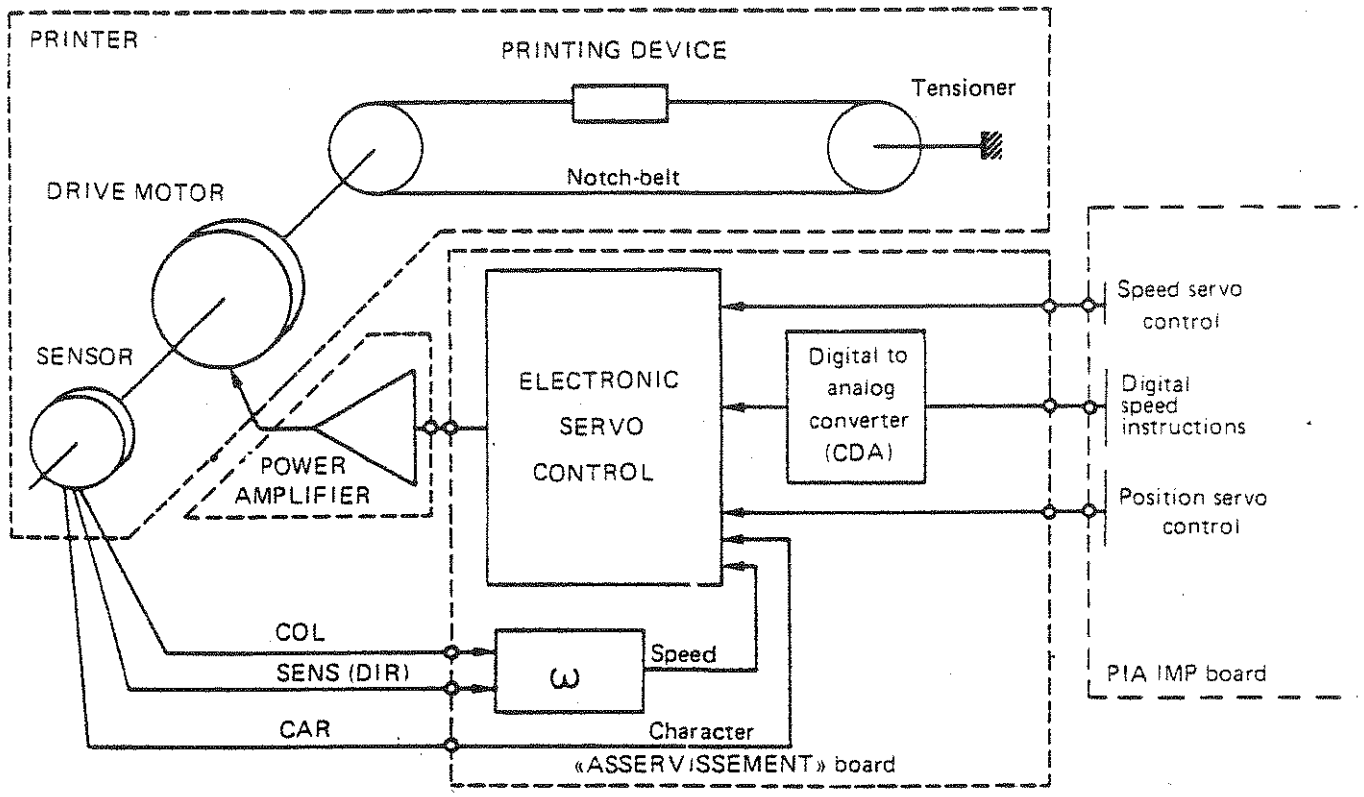
This signal is associated with the "column" signal so as to detect the direction of movement of the PRINTING DEVICE (right to left or left to right).

The speed and position servo loops are analog loops ; the digital speed instructions generated by the logic are converted into analog signals by a digital-to-analog converter (CDA).

. DRIVE MOTOR

The advance and return to beginning of line of the PRINTING DEVICE are carried out by means of a DC motor. It is slaved to data generated in the SENSOR and processed through the "ASSERVISSEMENT" and "PIA IMP" boards.

Motor movements are transmitted to the PRINTING DEVICE through two pulleys and a notch-belt.



PAPER ADVANCE

Basically, this consists of a paper store. A mechanical device receives 210 mm or 216 mm wide paper rolls. The paper store is equipped with a paper out switch. The closing of the switch contact results in :

- printing of the alarm message text,
- switching the unit in the inhibited mode.

LINE FEED CONTROL DEVICE

The paper drive is of the friction type. The paper is applied against the PLATEN by PRESSURE ROLLERS.

The PLATEN is rotated by a stepper motor (LINE FEED MOTOR). After printing, the message is cleared from the printing device to provide easy reading.

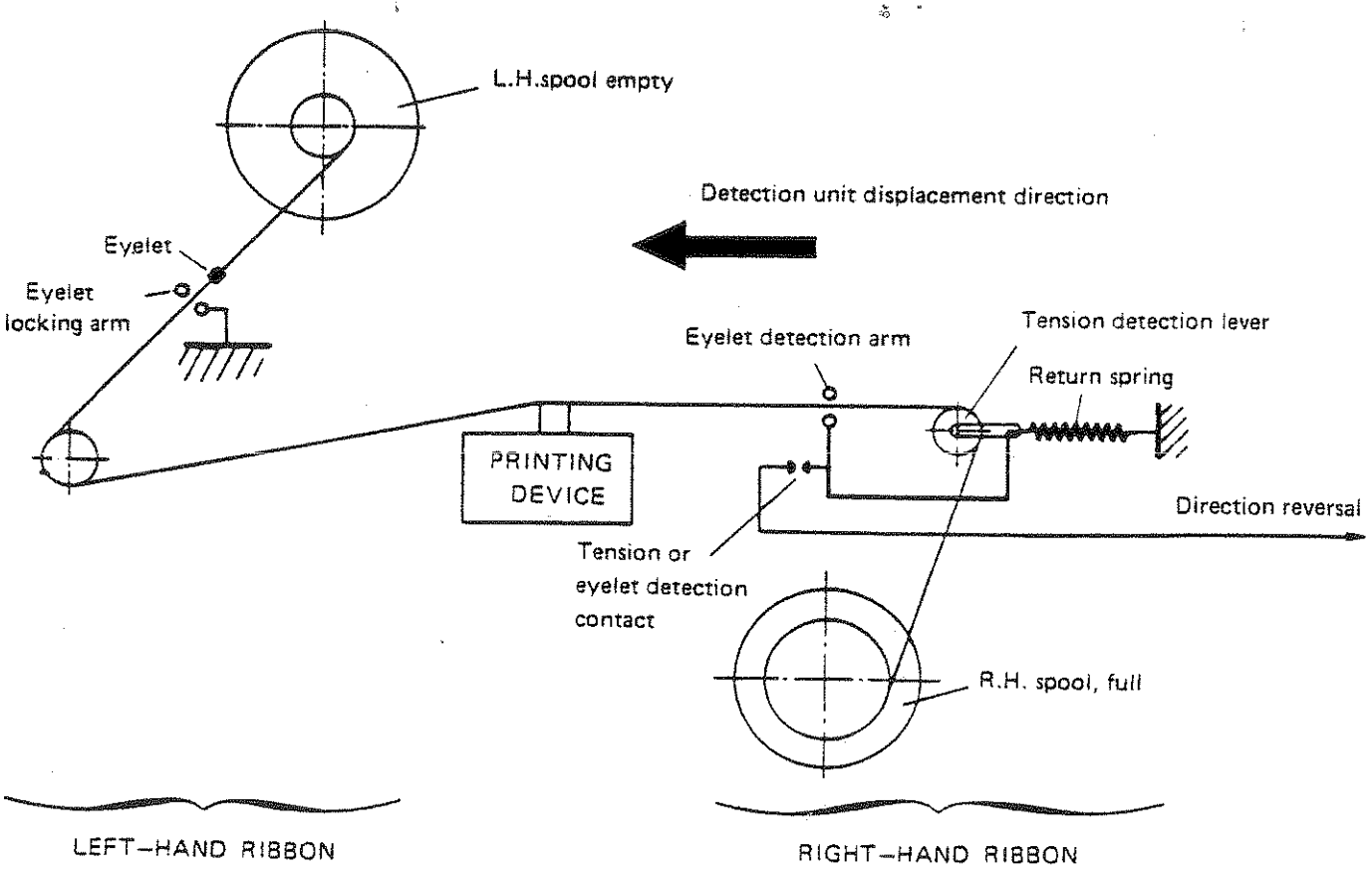
RIBBON ADVANCE AND REVERSE FEED

The drive device for the ink ribbon essentially comprises two autonomous modules :

- LEFT-HAND RIBBON,
- RIGHT-HAND RIBBON.

The LEFT-HAND RIBBON, basically comprising a DC motor, ensures that the ink ribbon tension is constant.

The RIGHT-HAND RIBBON, controls the movement of the ink ribbon and its reverse feed. Reversal is triggered when the ribbon eyelet locks in the eyelet detection arm or upon detection of a tension increase.



PRINTED CIRCUIT BOARDS

Function

The set of electronic boards controls the unit and the various modules.

Description

The electronic part consists of :

- an electronic boards rack containing the mother board in which are plugged the following boards :

. "ALIMENTATION" board	: groups ± 15 V, + 5 V, + 30 V power supplies, restart circuit and DRIVE MOTOR amplifier.
. "ASSERVISSEMENT" board	: generates DRIVE MOTOR amplifier signal.
. "PIA IMP" board	: contains PRINTER/bus input-output circuit (print, ribbon advance and reverse feed).
. "PIA ERD + IT/ADA" board	: contains TRANSMISSION/bus input-output circuit (way, interrupts, real time clock).
. "PIA LECTEUR + AMPLI" board	: contains TAPE READER/bus and ANSWER-BACK UNIT/bus input-output circuit.
. "PIA CLAVIER + MPU" board	: contains KEYBOARD/bus input-output circuit and microprocessor.
. "RAM + RPROM" board	: contains working memories (dynamic memories RAM) and program memories (read-only memory RPROM).
. "PIA PERFO + AMPLI" board	: contains TAPE PUNCH/bus input-output circuit and a fraction of PRINTER/bus input-output circuit (line feed).
. "NUMEROTATION ABREGEE" board	: contains subscriber numerals/bus input-output circuit.
. "PERSONNALISATION" board	: contains the options/bus input-output circuit (remote control and miscellaneous instructions).

- an "ADAPTATION" board ensures interface between the unit and the transmission way,

- a power supply, consisting of the following modules :

  . MAINS CABLE : allows the unit to be connected to the mains.

  . MAINS FILTER : provides mains filtration and contains the LIGHTNING ARRESTOR ("PARAFOUDRE" board).

  . TRANSFORMER : supplies AC voltages.

  . "ALIMENTATION" board : see "PRINTED CIRCUIT BOARDS" paragraph.

  . POWER AMPLIFIER : contains power transistors for + 5 V and + 30 V power supplies, and amplifier power stage for the DRIVE MOTOR. This module is mounted on the radiator at the rear of the unit.

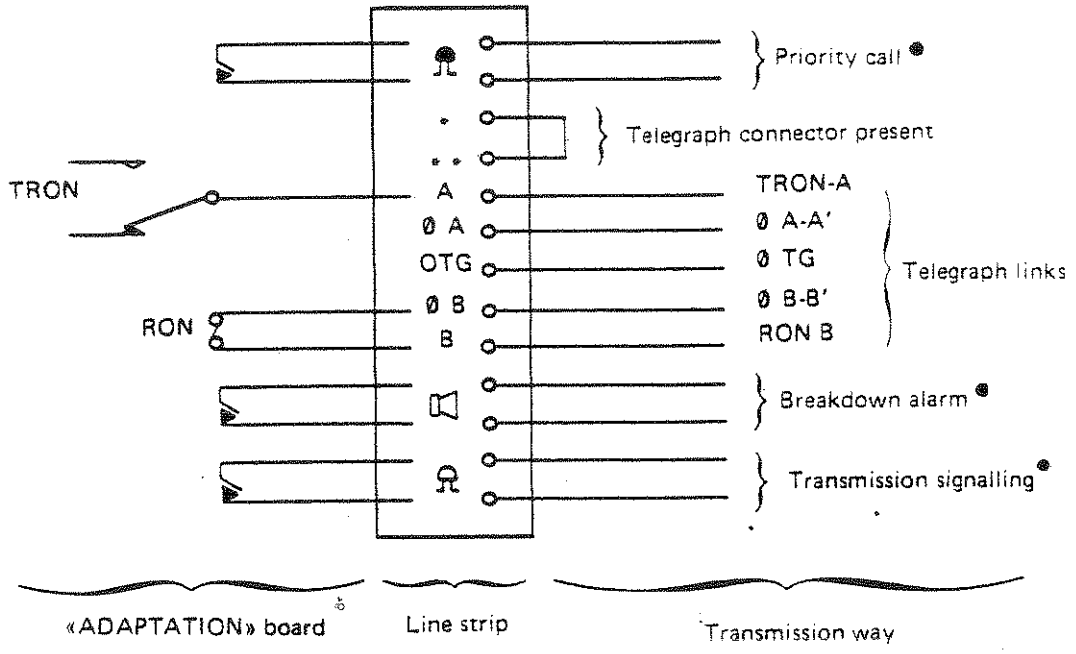
  . $\pm$ 12 V POWER SUPPLY : contains rectifier and filter for DRIVE MOTOR power supply.

  . POWER SUPPLY PROTECTION : ensures the protection at each transformer secondary outlets.

PLACING IN OPERATION

. Connection to a transmission way

The line terminal strip, located at the rear of the unit, is used for connection to a transmission way.



The following functions :

- Priority call,
- Breakdown alarm,
- Transmission signalling,

can be signalled by means of devices (luminous, acoustic, etc.) mounted on the exterior of the unit.

Relay contacts are accessible on the line strip.

The electrical characteristics of the relay contacts are as follows :

- maximum voltage : 100 V,
- maximum current : 250 mA,
- maximum cut-off capacity : 10 W,
- contact resistance : < 150 mΩ.

• This function may differ according to the type of unit.

To connect the telegraph links to the transmission way, refer to the technical sheet entitled : "DIFFERENT CASES OF TELEGRAPH CONNECTIONS".

2

MAINTENANCE MANUAL

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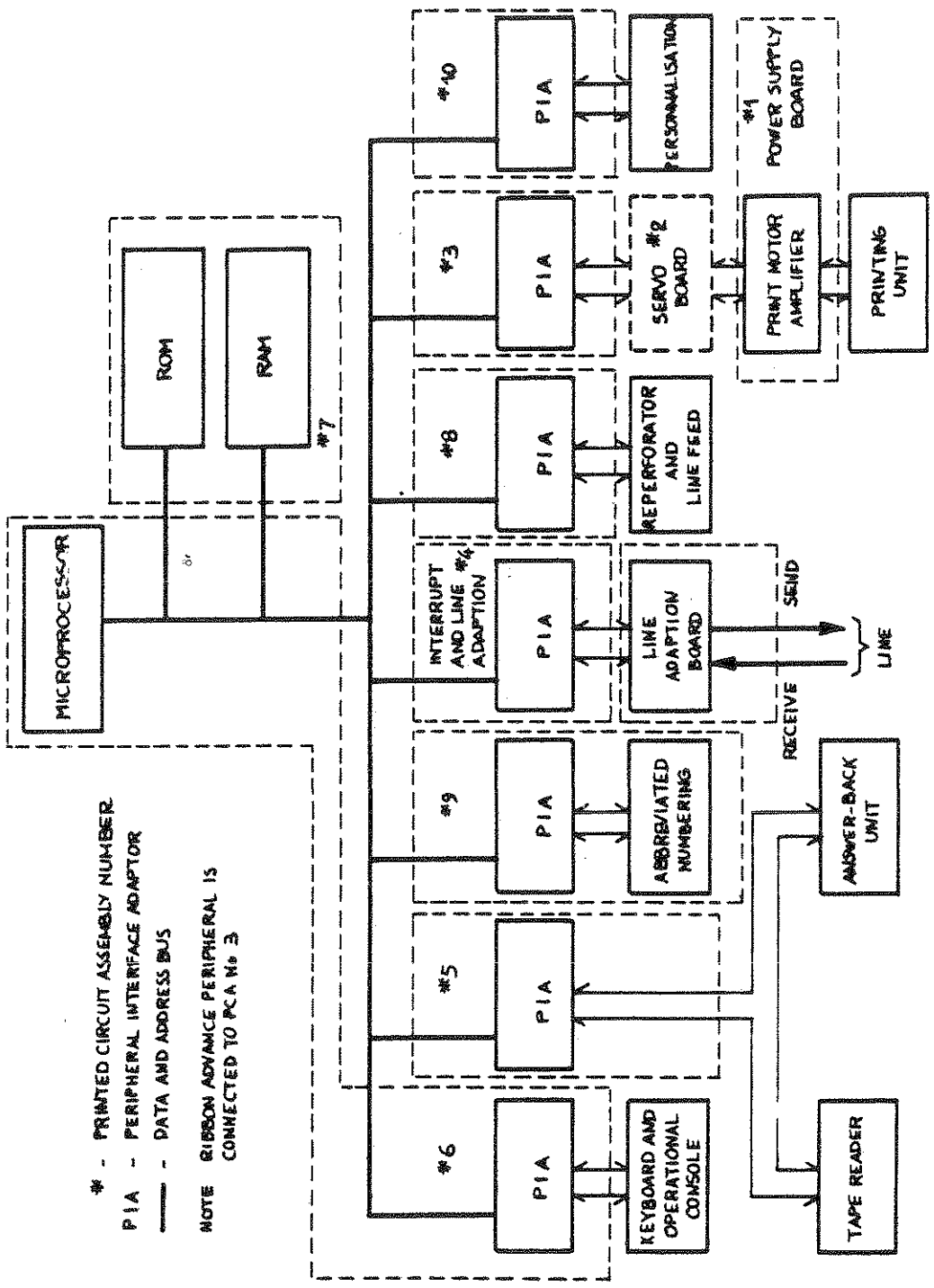
P L A T E S

PLATE 2-1 - MODULES LOCATION

PLATE 2-2 - WIRING DIAGRAM

1 – OPERATIONAL DIAGRAM OF MODULES



TX20 BLOCK DIAGRAM

MODULE	LOCATION OF ASSOCIATED ELECTRONICS	
OPERATIONAL CONSOLE	"PIA CLAVIER + MPU" board	6
	"PERSONNALISATION" board	10
	"RAM + RPROM" board	7
KEYBOARD	"PIA CLAVIER + MPU" board	6
ANSWER-BACK UNIT	"PIA LECTEUR + AMPLI" board	5
	"PERSONNALISATION" board	10
	"RAM + RPROM" board	7
TAPE READER	"PIA LECTEUR + AMPLI" board	5
	"RAM + RPROM" board	7
TAPE PUNCH	"PIA PERFO + AMPLI" board	8
	"PERSONNALISATION" board	10
	"RAM + RPROM" board	7
TAPE STORE	"PIA PERFO + AMPLI" board	8
PRINTER, consisting of :		
. PRINTING DEVICE	"PIA IMP" board	3
. SENSOR	"ASSERVISSEMENT" board	2
. DRIVE MOTOR	POWER AMPLIFIER	
	"ALIMENTATION" board	1
	"ASSERVISSEMENT" board	2
. PAPER ADVANCE	"PIA ERD + IT/ADA" board	4
. LINE FEED MOTOR	"PIA PERFO + AMPLI" board	8
	"PERSONNALISATION" board	10
. RIBBON ASSEMBLY (LEFT)	"PIA IMP" board	3
. RIBBON ASSEMBLY (RIGHT)	"PIA IMP" board	3
	"PIA PERFO + AMPLI" board	8
	"PIA ERD + IT/ADA" board	4
"NUMEROTATION ABREGEE"	"PIA CLAVIER + MPU" board	6
TRANSMISSION UNIT	"PIA ERD + IT/ADA" board	4
	"ADAPTATION" board	TG4
Power supply	POWER AMPLIFIER	
	"ALIMENTATION" board	1
	± 12 V POWER SUPPLY	
	TRANSFORMER	
	MAINS FILTER	
	"PARAFOUDRE"	
	MAINS CABLE	
	"RAM + RPROM" board	

2 – GENERAL

This MAINTENANCE MANUAL is to assist the technician at the operating site.

Each function may concern several modules in the unit. In case of opération failure, proceed as follows :

- select the defective function,
- localize the defective module using the troubleshooting flow charts,
- replace the defective module, according to the chapter REMOVAL AND INSTALLATION OF MODULES.

When a function is defective, the failure may be located in an electronic board or in an electro-mechanical device. The troubleshooting flow charts include the principal possible failures and allow to localize the defective module.

When a defective module has been detected, it is important to replace it and to install the previously removed modules, in order to set the unit in its operating condition again.

CAUTION : Before any module disconnection or connection, it is mandatory to switch off the unit.

NOTE 1 : When replacing the PIA LECTEUR + AMPLI board, remove the ANSWER-BACK CODE memory package (Y3) and plug it on the new board.

NOTE 2 : When replacing the RAM + RPROM board, when necessary transfer each memory package from the previous to the same location on the new board.

3 – TROUBLESHOOTING FLOW CHARTS

TROUBLESHOOTING FLOW CHARTS ORGANIZATION

The general troubleshooting flow chart, allows the selection of the defective function (ex. : PRINTING 11). Each function is numbered from 1 to 11. At each function corresponds a list of failures, identified through two numbers according to the following scheme :

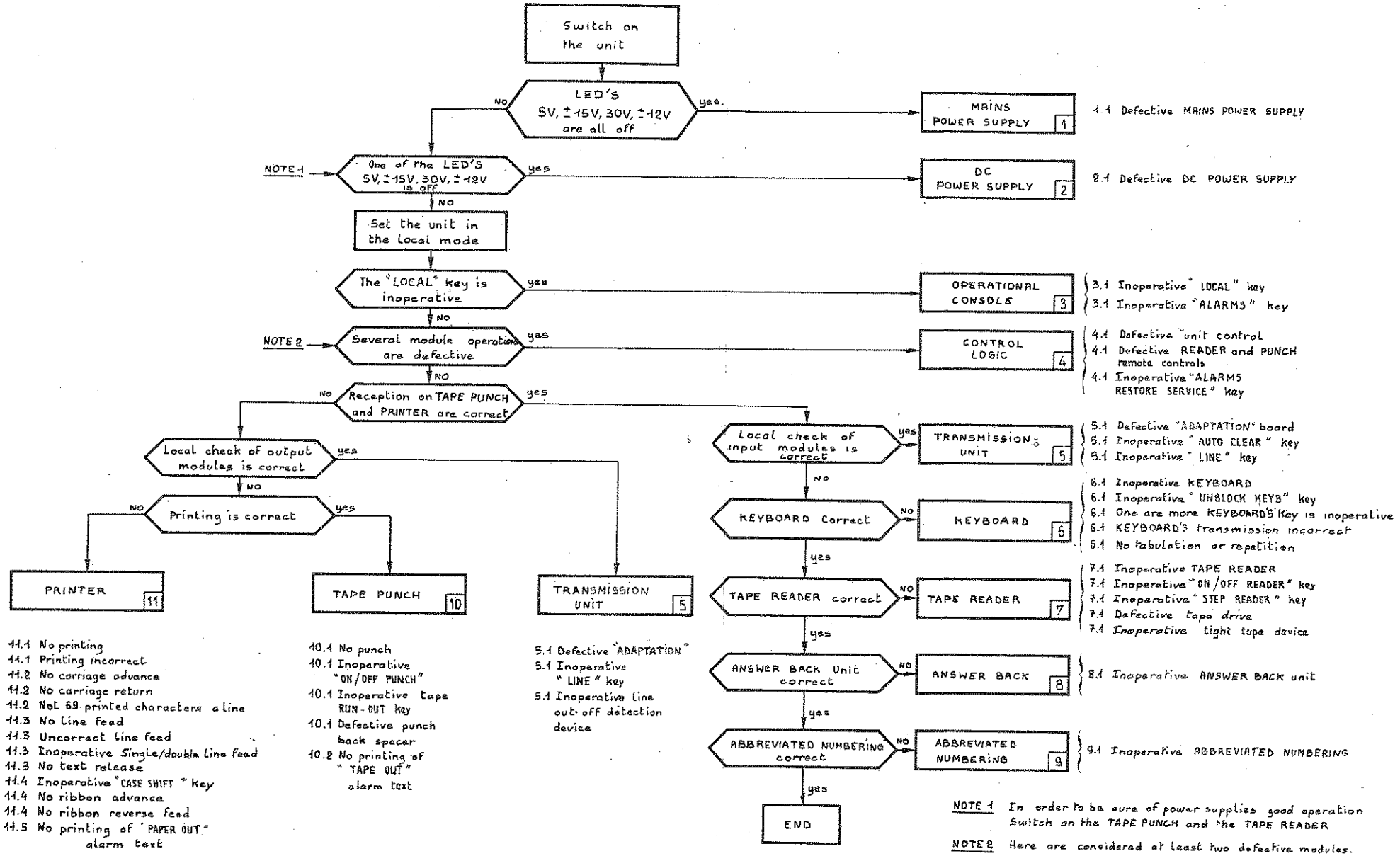
- the first one corresponds to the defective function,
- the second one corresponds to the relevant flow chart number.

EXAMPLE : No printing 11.1

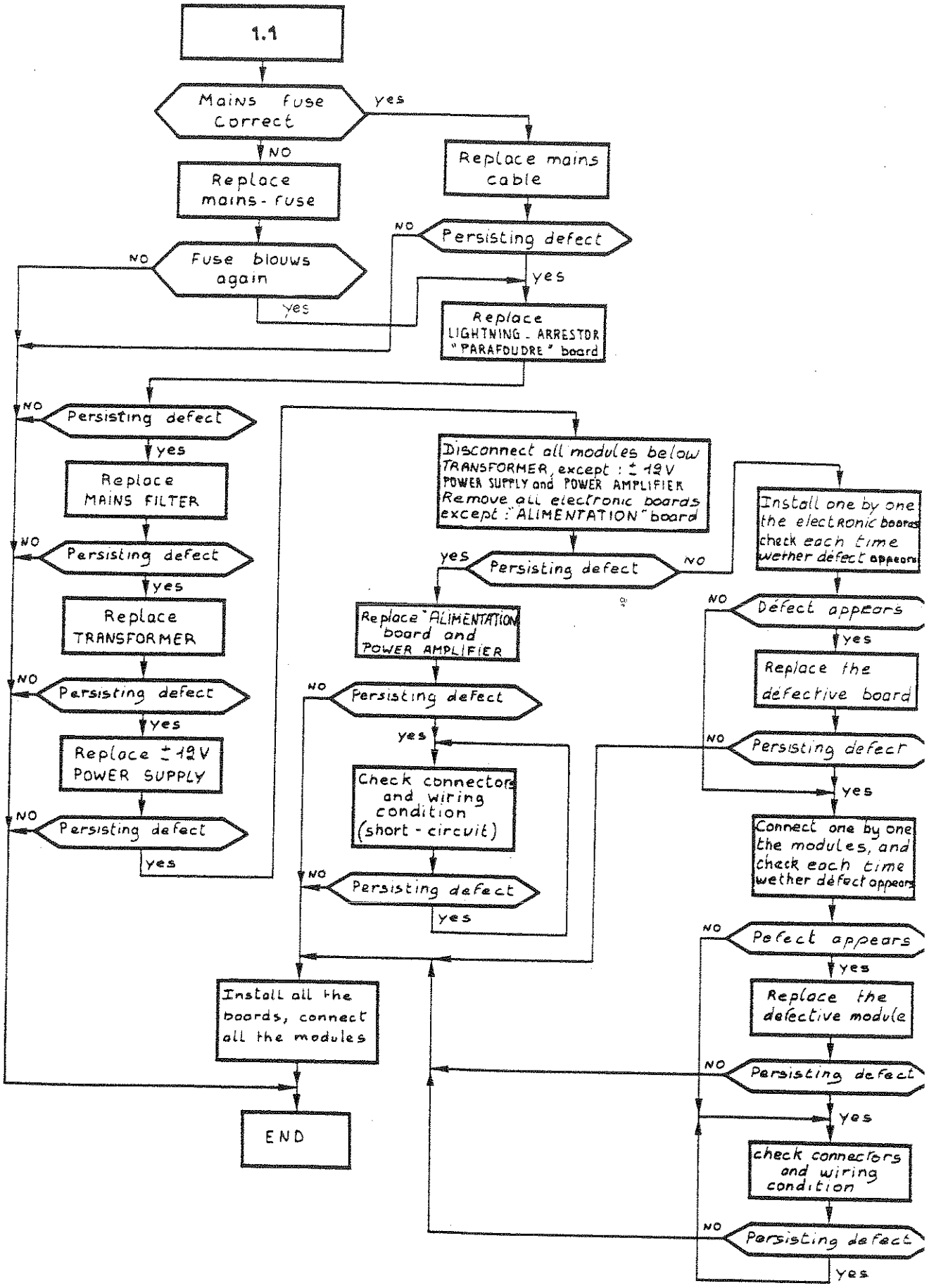
11 → PRINTING function.

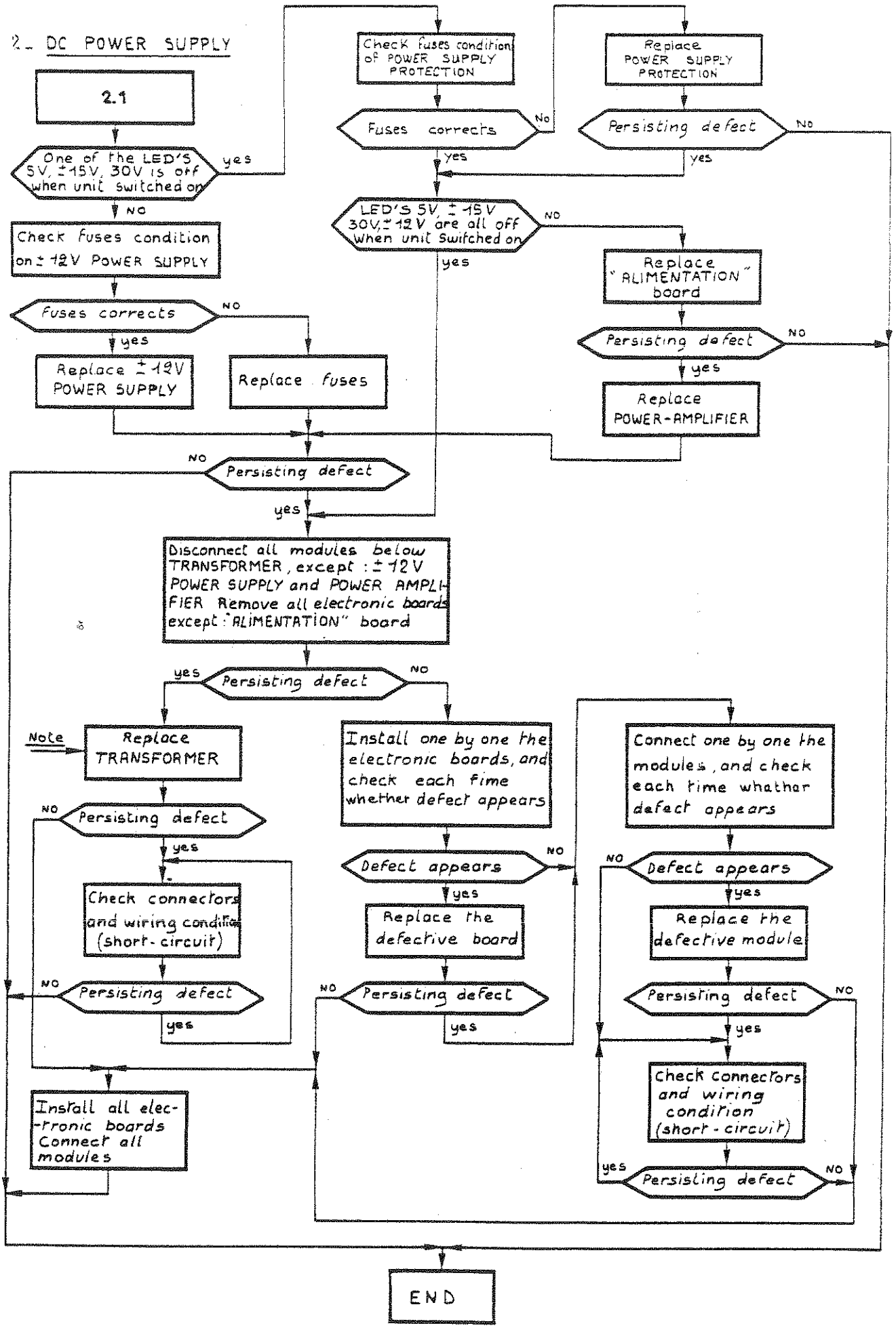
1 → PRINTING function first troubleshooting flow chart.

GENERAL TROUBLE SHOOTING FLOW CHART



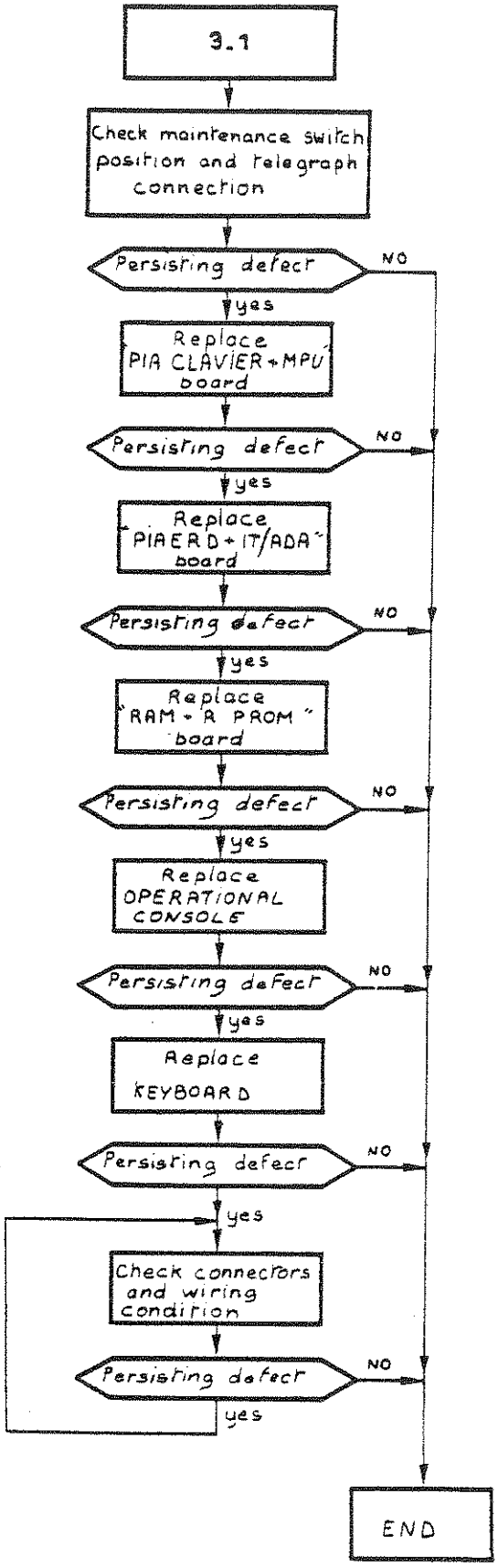
1 - MAINS POWER SUPPLY



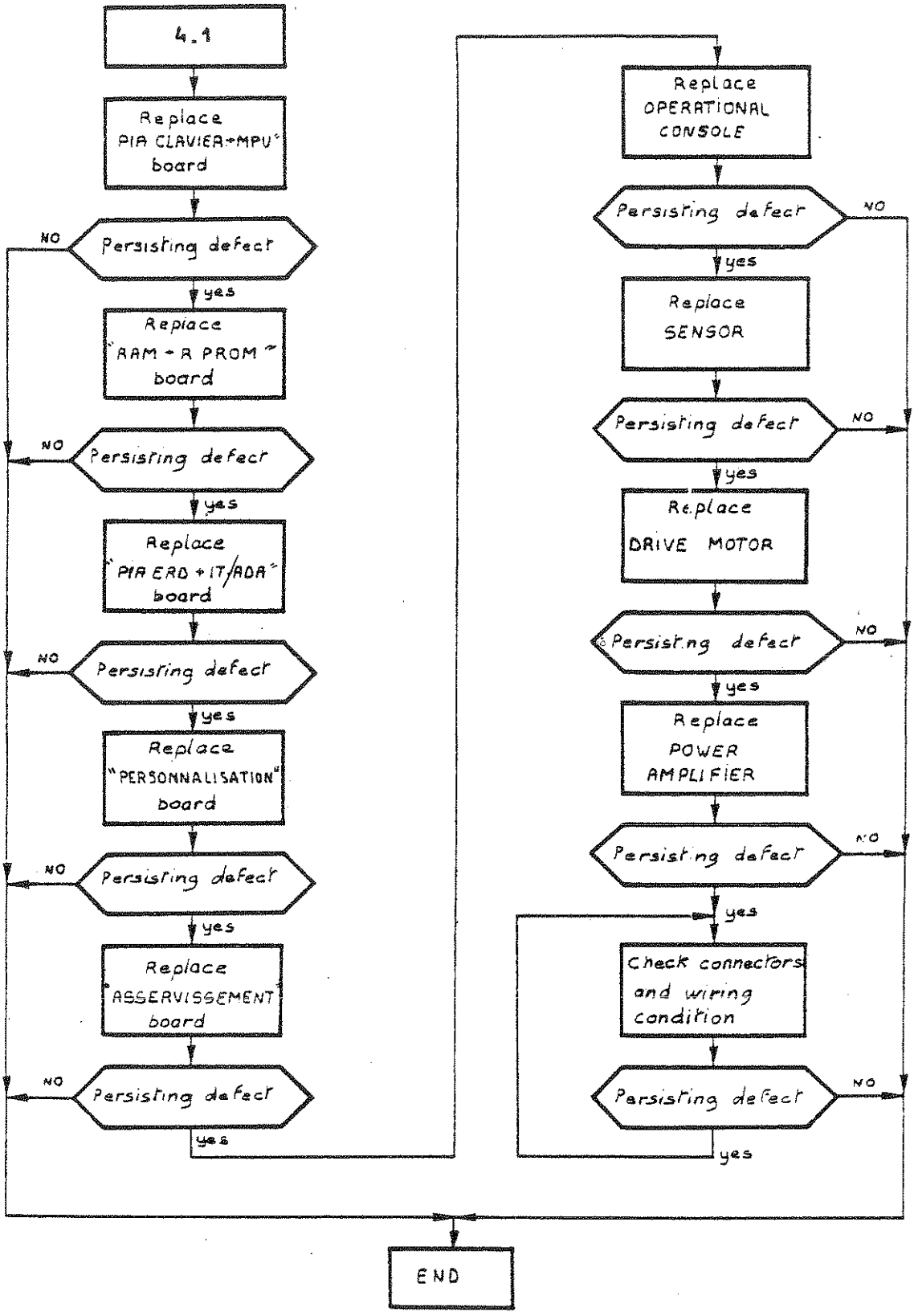


NOTE : Replace the latter whether is was not changed in 1_1

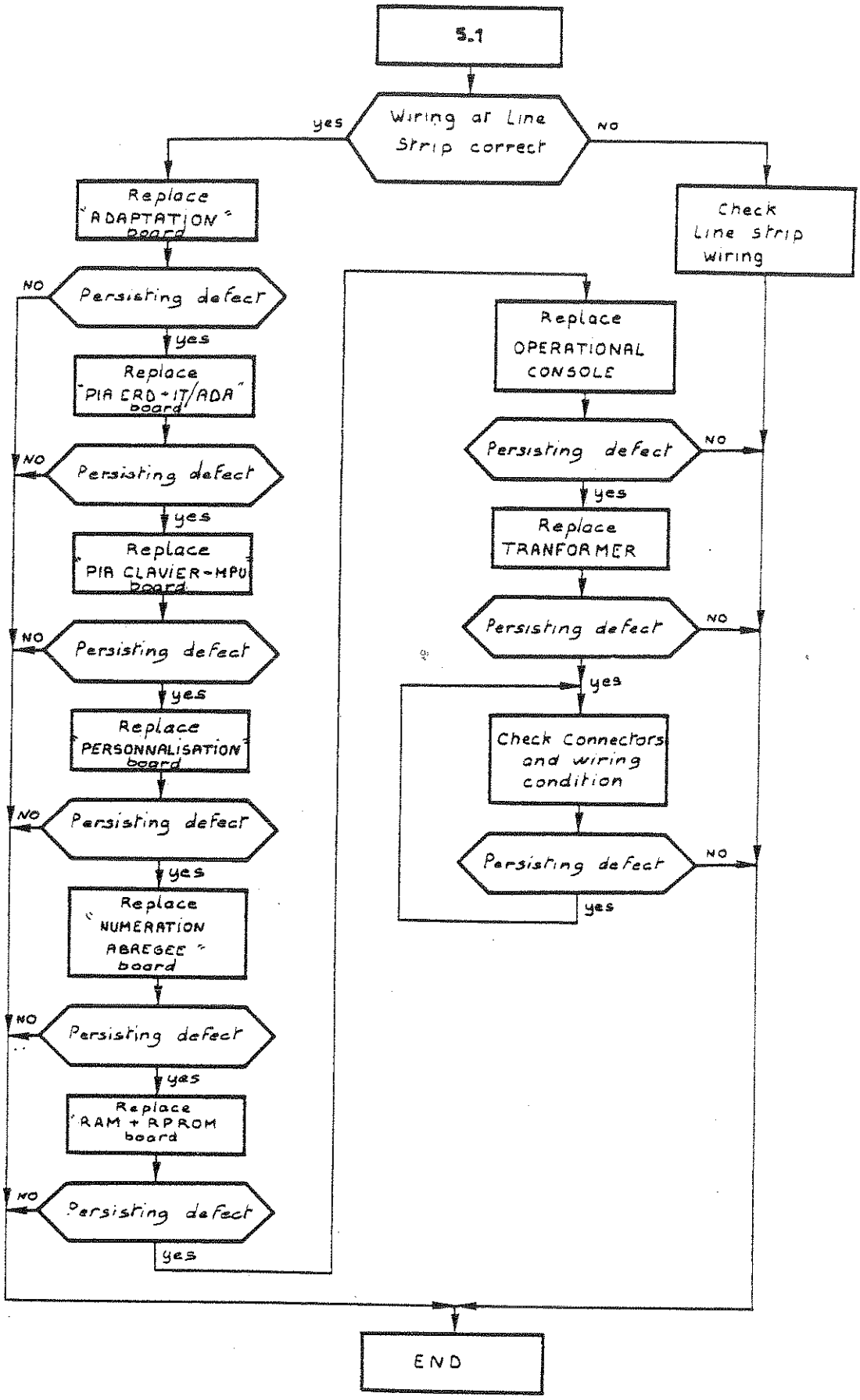
3_ OPERATIONAL CONSOLE



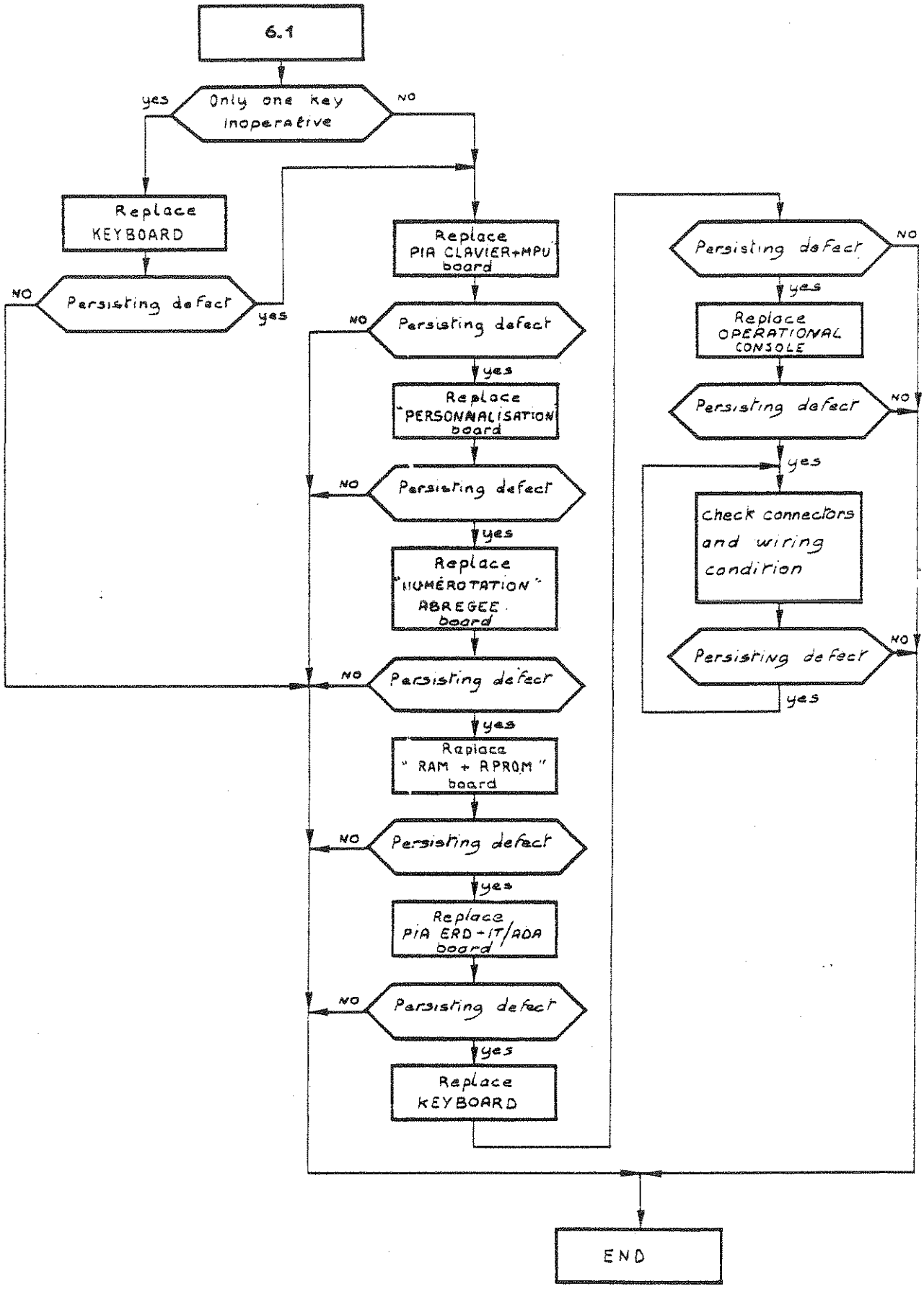
4 - CONTROL LOGIC



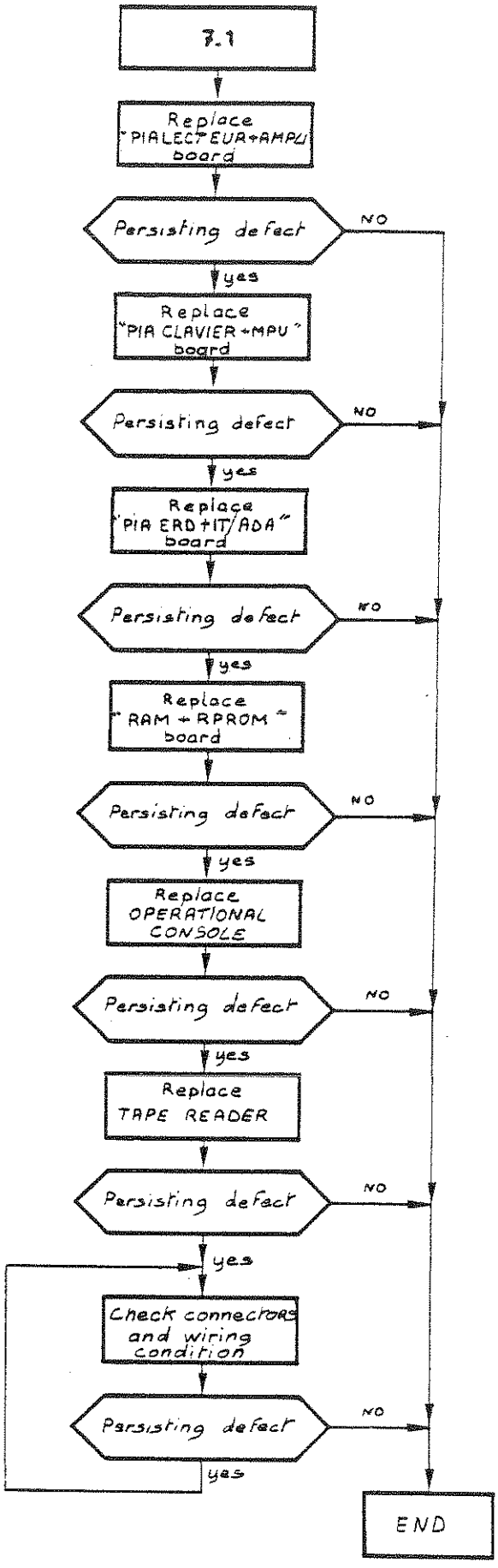
5_ TRANSMISSION UNIT



6 - KEYBOARD

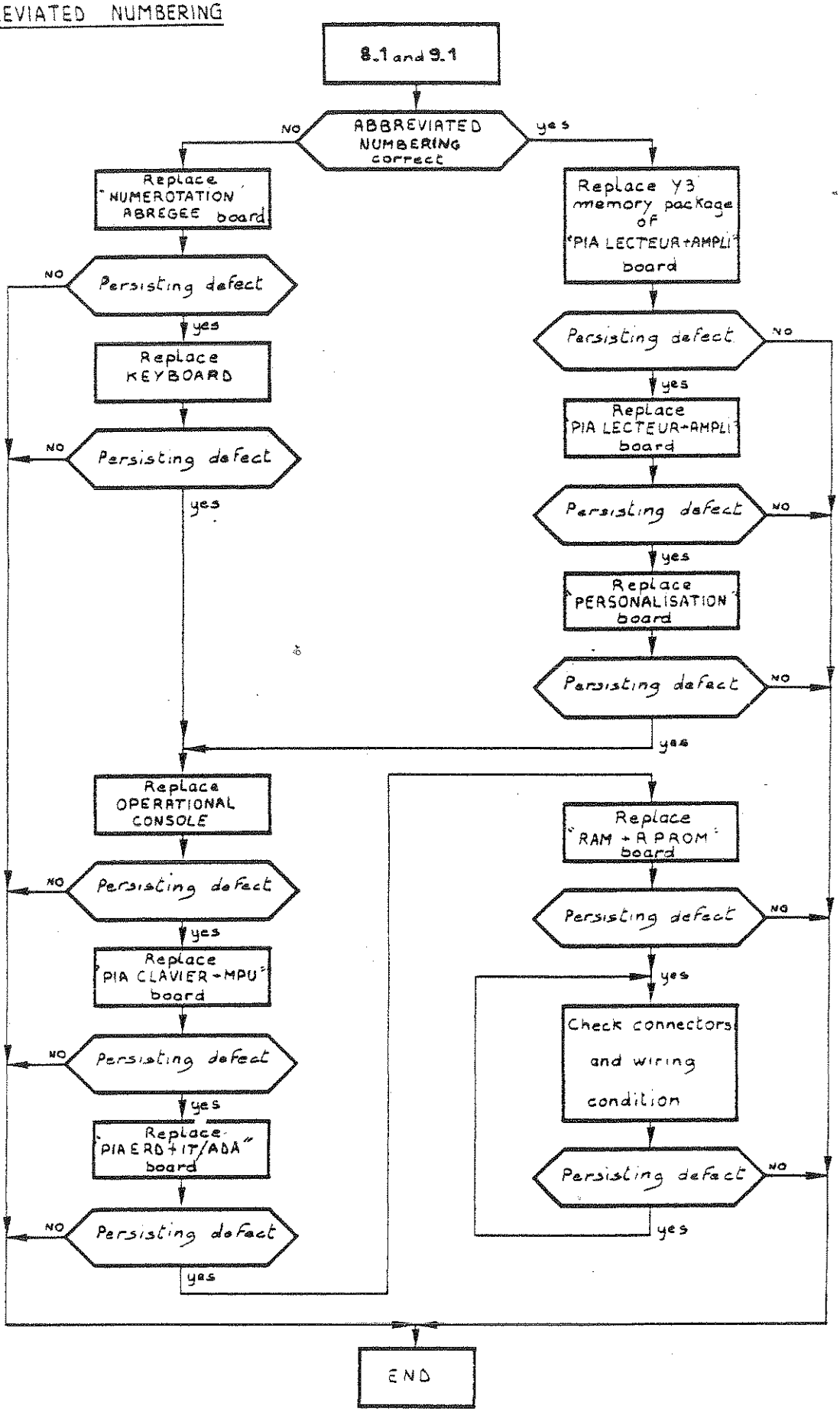

6.1
Only one key inoperative
yes
NO
Replace KEYBOARD
Persisting defect
NO
yes
Replace PIA CLAVIER+MPU board
Persisting defect
NO
yes
Replace "PERSONNALISATION" board
Persisting defect
NO
yes
Replace "NUMÉROTATION ABREGEE" board
Persisting defect
NO
yes
Replace " RAM + RPROM " board
Persisting defect
NO
yes
Replace PIA ERD-IT/ADA board
Persisting defect
NO
yes
Replace KEYBOARD
Persisting defect
NO
yes
Replace OPERATIONAL CONSOLE
Persisting defect
NO
yes
check connectors and wiring condition
Persisting defect
NO
yes
END

7- TAPE READER

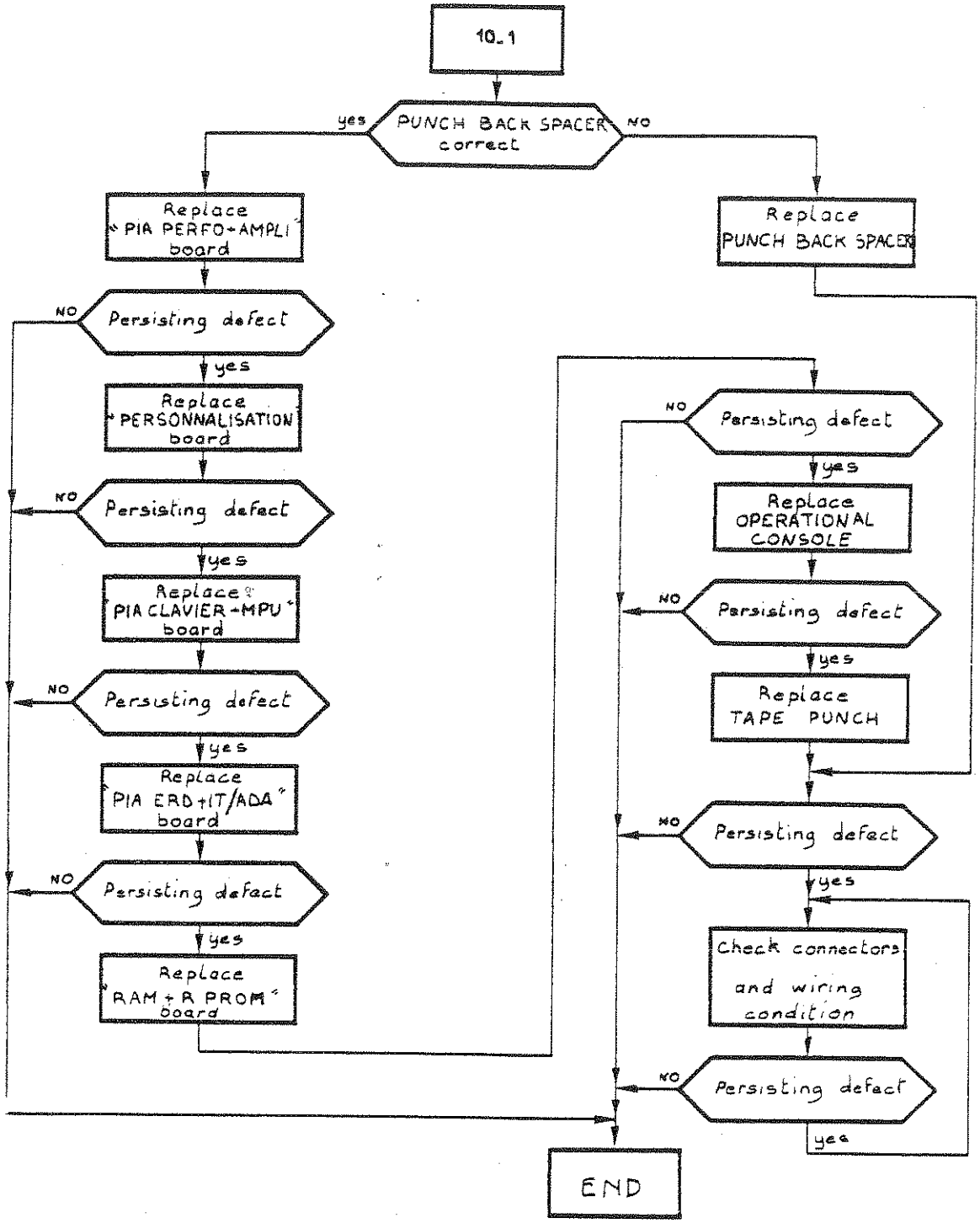


8_ ANSWER BACK CODE

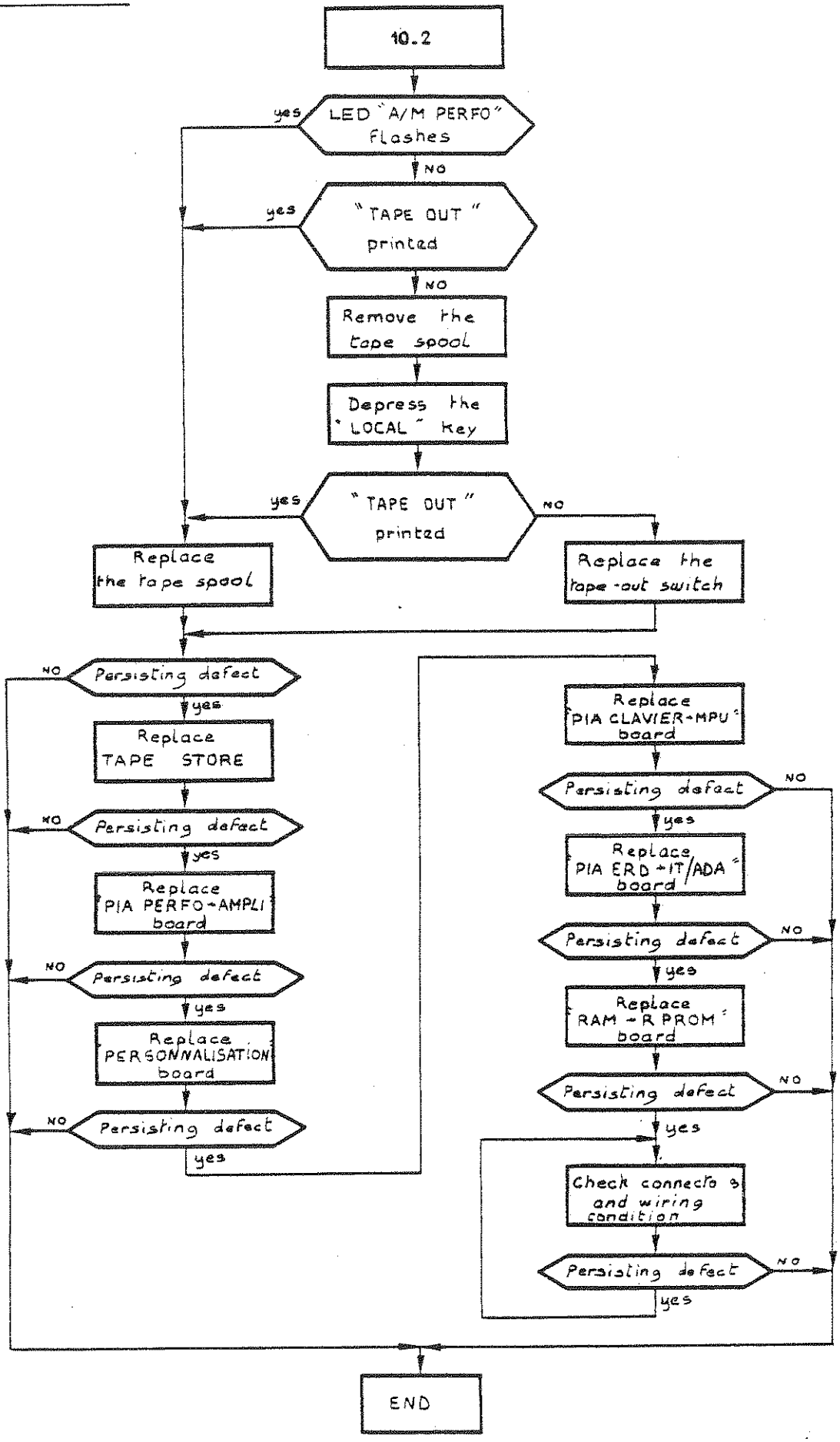
9_ ABBREVIATED NUMBERING



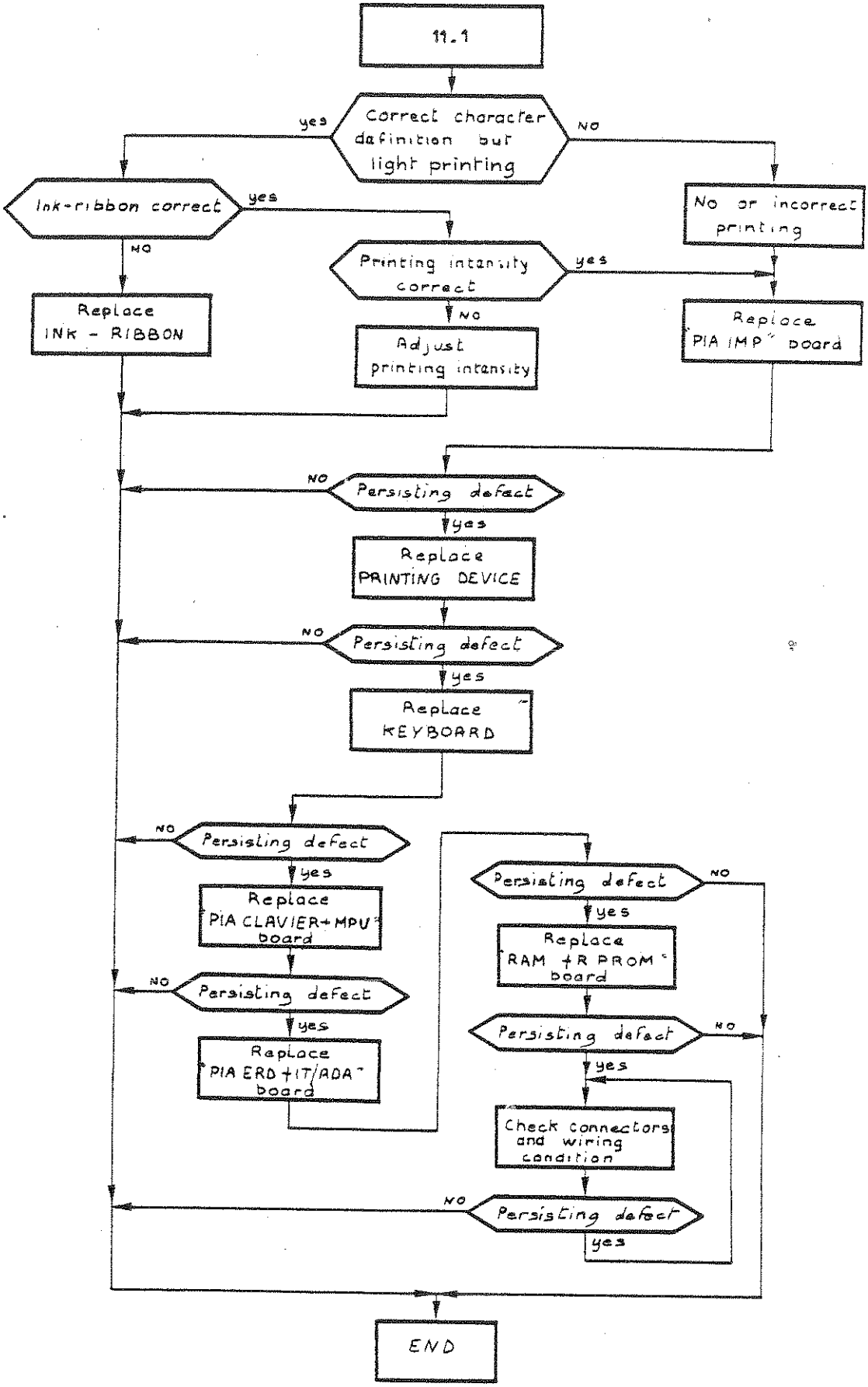
10 - TAPE PUNCH



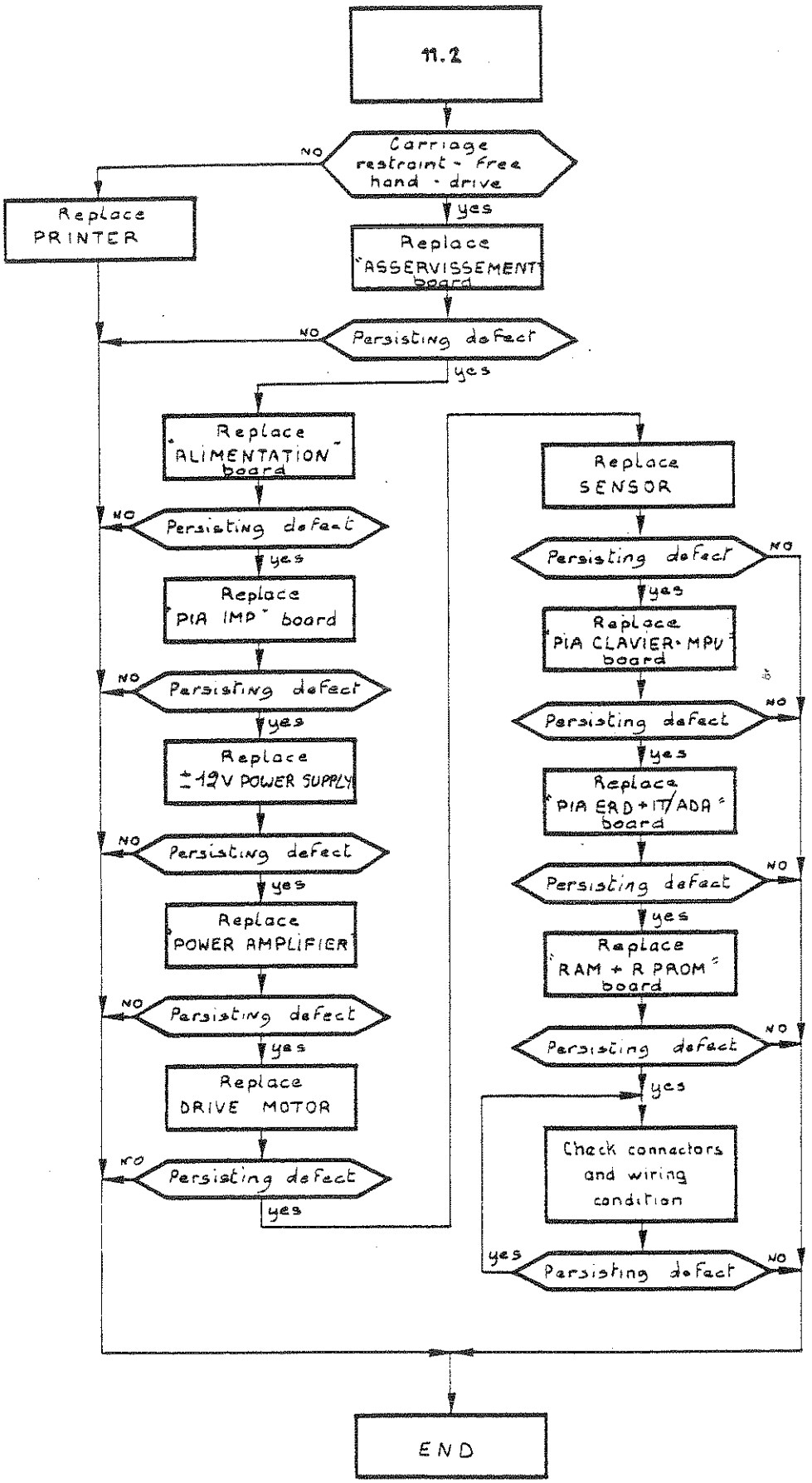
10 - TAPE PUNCH



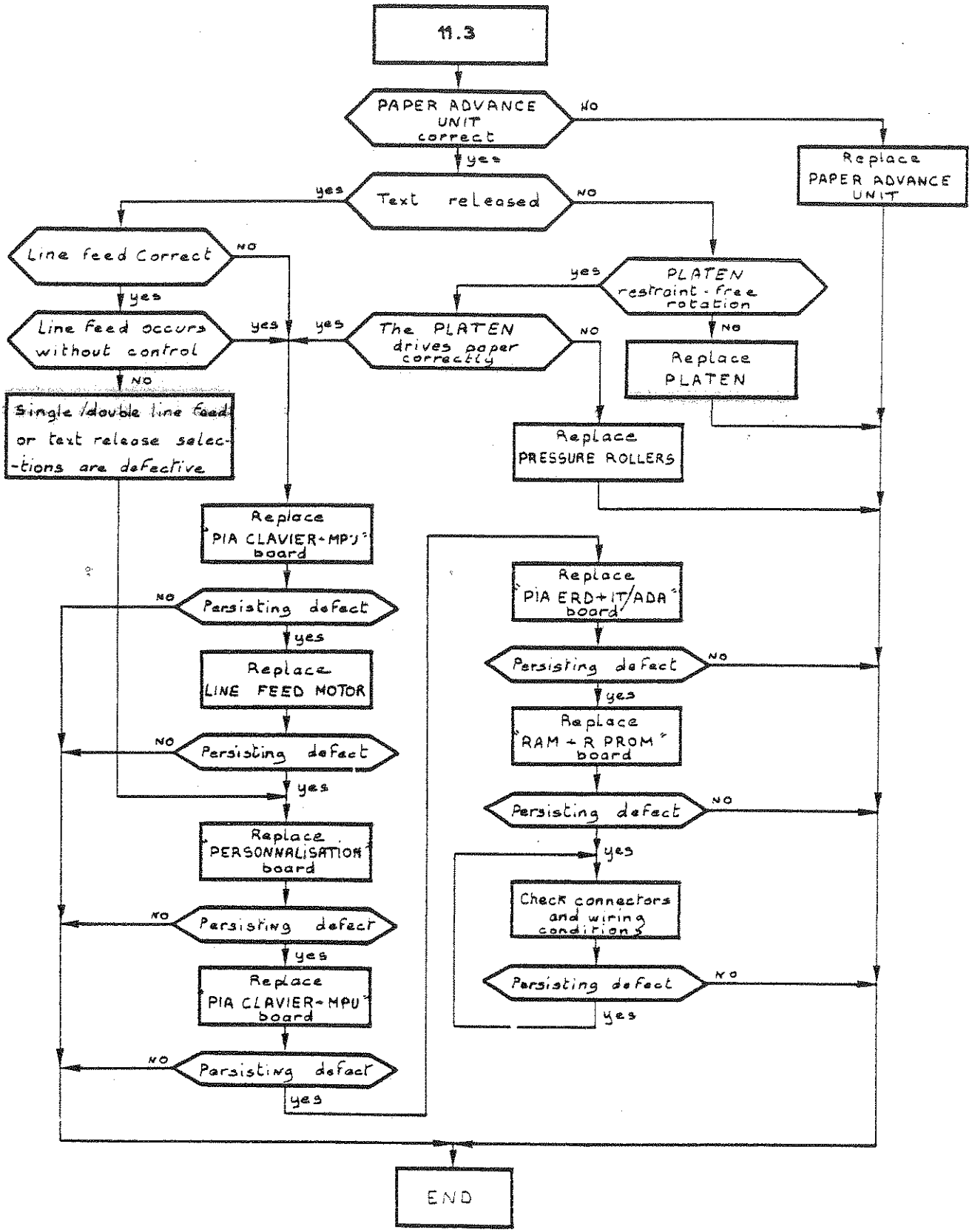
11 - PRINTER


11.1
Correct character definition but light printing
yes
NO
Ink-ribbon correct
yes
NO
No or incorrect printing
Printing intensity correct
yes
NO
Replace INK - RIBBON
Adjust printing intensity
Replace "PIA IMP" board
NO
Persisting defect
yes
Replace PRINTING DEVICE
NO
Persisting defect
yes
Replace KEYBOARD
NO
Persisting defect
yes
Replace "PIA CLAVIER+MPU" board
NO
Persisting defect
yes
Replace "PIA ERD+IT/ADA" board
Persisting defect
NO
yes
Replace "RAM +R PROM" board
Persisting defect
NO
yes
Check connectors and wiring condition
NO
Persisting defect
yes
END

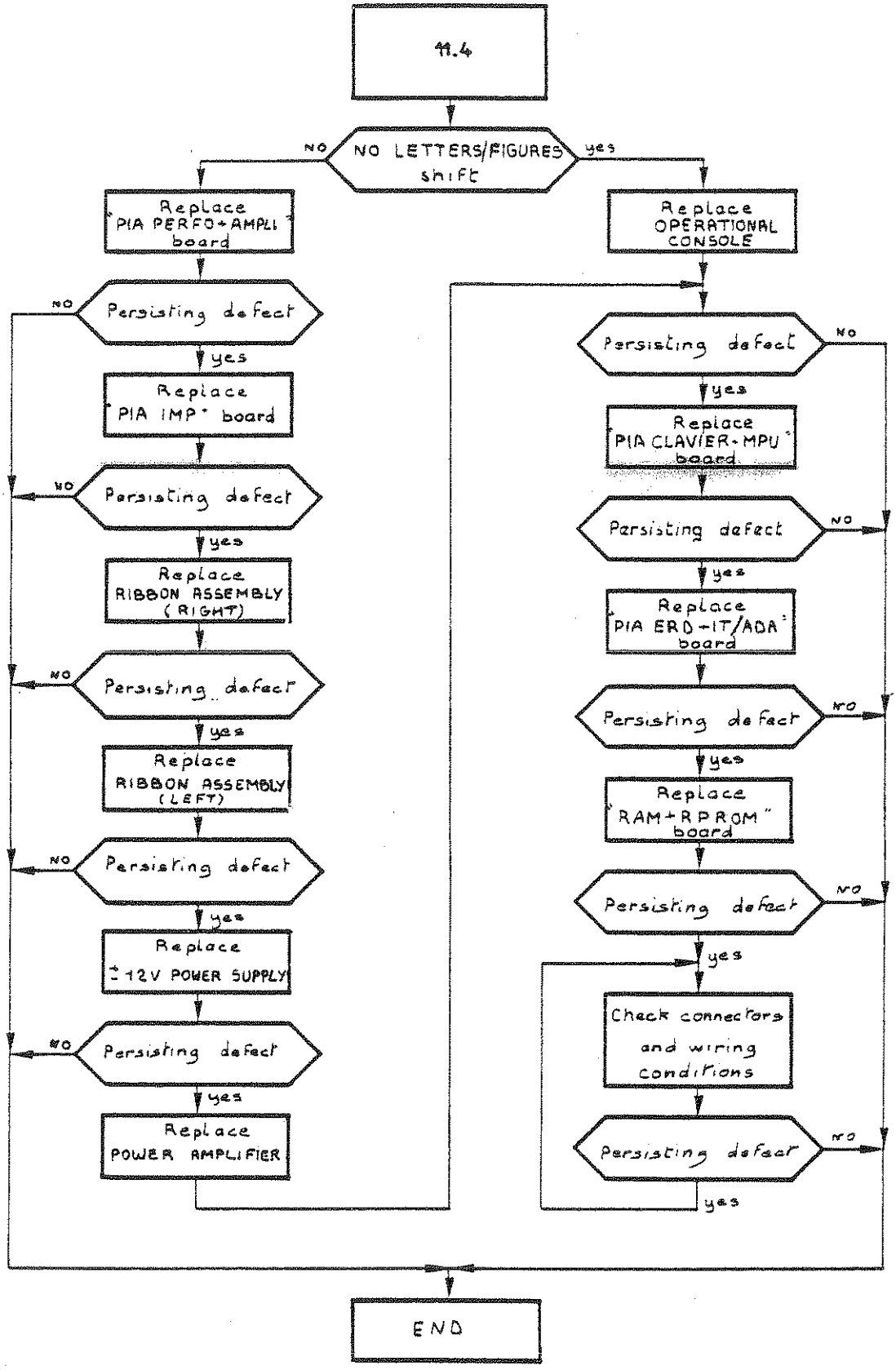
11_ PRINTER


11.2
Carriage restraint - free hand - drive
NO
yes
Replace PRINTER
Replace "ASSERVISSEMENT" board
Persisting defect
NO
yes
Replace "ALIMENTATION" board
Persisting defect
NO
yes
Replace "PIA IMP" board
Persisting defect
NO
yes
Replace ±12V POWER SUPPLY
Persisting defect
NO
yes
Replace POWER AMPLIFIER
Persisting defect
NO
yes
Replace DRIVE MOTOR
Persisting defect
NO
yes
Replace SENSOR
Persisting defect
NO
yes
Replace "PIA CLAVIER-MPU" board
Persisting defect
NO
yes
Replace "PIA ERD+IT/ADA" board
Persisting defect
NO
yes
Replace "RAM + R PROM" board
Persisting defect
NO
yes
Check connectors and wiring condition
yes
Persisting defect
NO
END

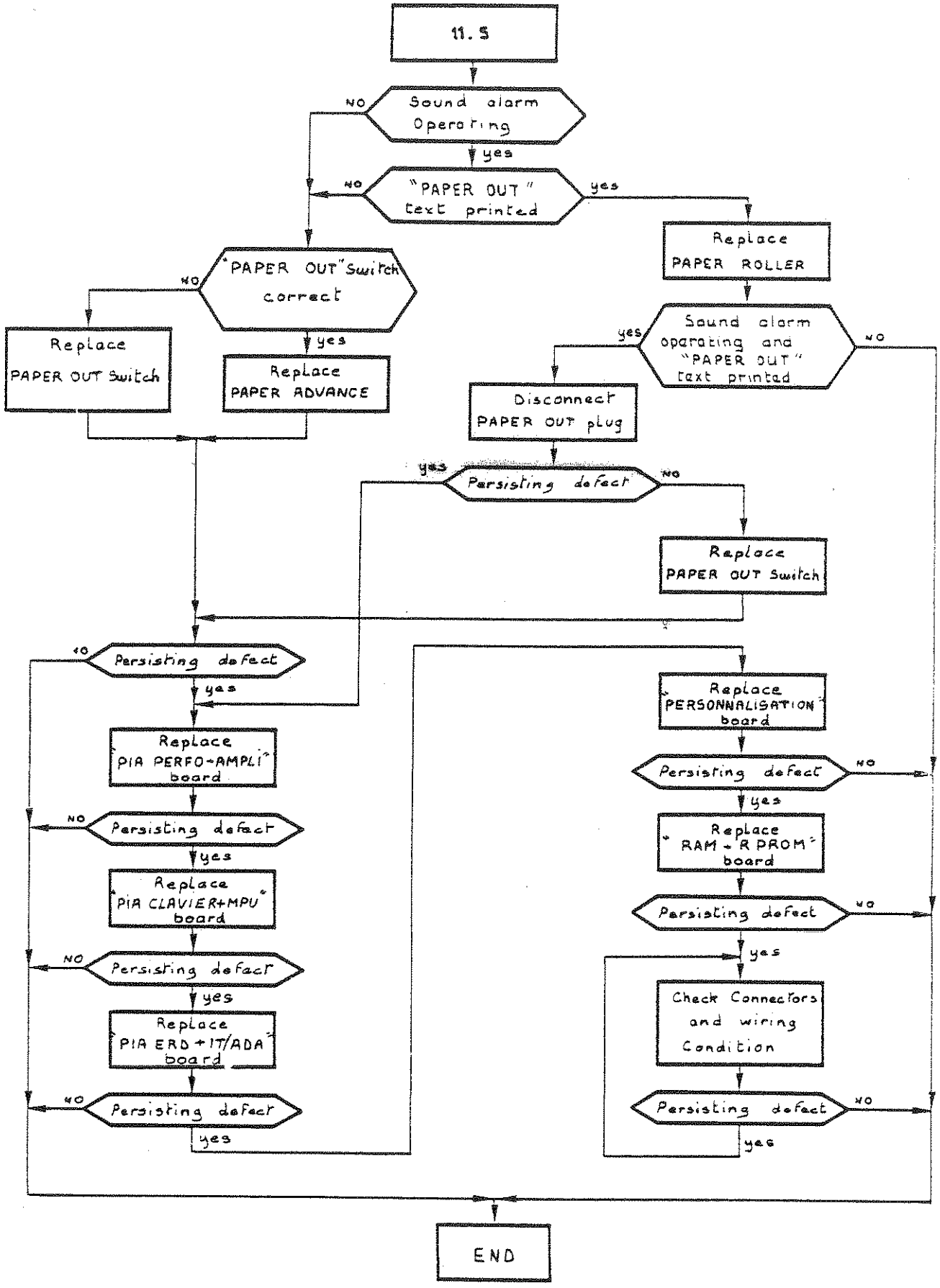
11 - PRINTER


11.3
PAPER ADVANCE UNIT correct
NO
Replace PAPER ADVANCE UNIT
yes
Text released
yes
NO
Line feed Correct
NO
yes
PLATEN restraint-free rotation
yes
Line feed occurs without control
yes
yes
The PLATEN drives paper correctly
NO
NO
Replace PLATEN
NO
Single/double line feed or text release selections are defective
Replace PRESSURE ROLLERS
Replace PIA CLAVIER-MPU board
Replace PIA ERD-IT/ADA board
NO
Persisting defect
yes
Persisting defect
NO
yes
Replace LINE FEED MOTOR
Replace RAM + R PROM board
NO
Persisting defect
yes
Persisting defect
NO
yes
Replace PERSONNALISATION board
Check connectors and wiring conditions
NO
Persisting defect
yes
Persisting defect
NO
yes
Replace PIA CLAVIER-MPU board
NO
Persisting defect
yes
END

11. PRINTER


11.4
NO LETTERS/FIGURES shift
NO
yes
Replace PIA PERFO-AMPLI board
Replace OPERATIONAL CONSOLE
Persisting defect
NO
yes
Replace PIA IMP* board
Replace RIBBON ASSEMBLY (RIGHT)
Replace RIBBON ASSEMBLY (LEFT)
Replace ± 12V POWER SUPPLY
Replace POWER AMPLIFIER
Replace PIA CLAVIER-MPU board
Replace PIA ERD-IT/ADA board
Replace "RAM+RPROM" board
Check connectors and wiring conditions
END

11 - PRINTER


11.5
Sound alarm Operating
NO
yes
"PAPER OUT" text printed
NO
yes
Replace PAPER ROLLER
"PAPER OUT" Switch correct
NO
yes
Replace PAPER OUT Switch
Replace PAPER ADVANCE
Sound alarm operating and "PAPER OUT" text printed
yes
NO
Disconnect PAPER OUT plug
yes
Persisting defect
NO
Replace PAPER OUT Switch
NO
Persisting defect
yes
Replace PIA PERFO-AMPLI board
NO
Persisting defect
yes
Replace PIA CLAVIER+MPU board
NO
Persisting defect
yes
Replace PIA ERD+IT/ADA board
NO
Persisting defect
yes
Replace PERSONNALISATION board
Persisting defect
NO
yes
Replace RAM-R PROM board
Persisting defect
NO
yes
Check Connectors and wiring Condition
Persisting defect
NO
yes
END

4 – REMOVAL AND INSTALLATION OF MODULES

Modules and their attachments are marked on plate 2-1 (MODULES LOCATION). The text refers to this plate.

CAUTION : - Never loosen painted screws.

- Before starting any work, disconnect the MAINS CABLE.

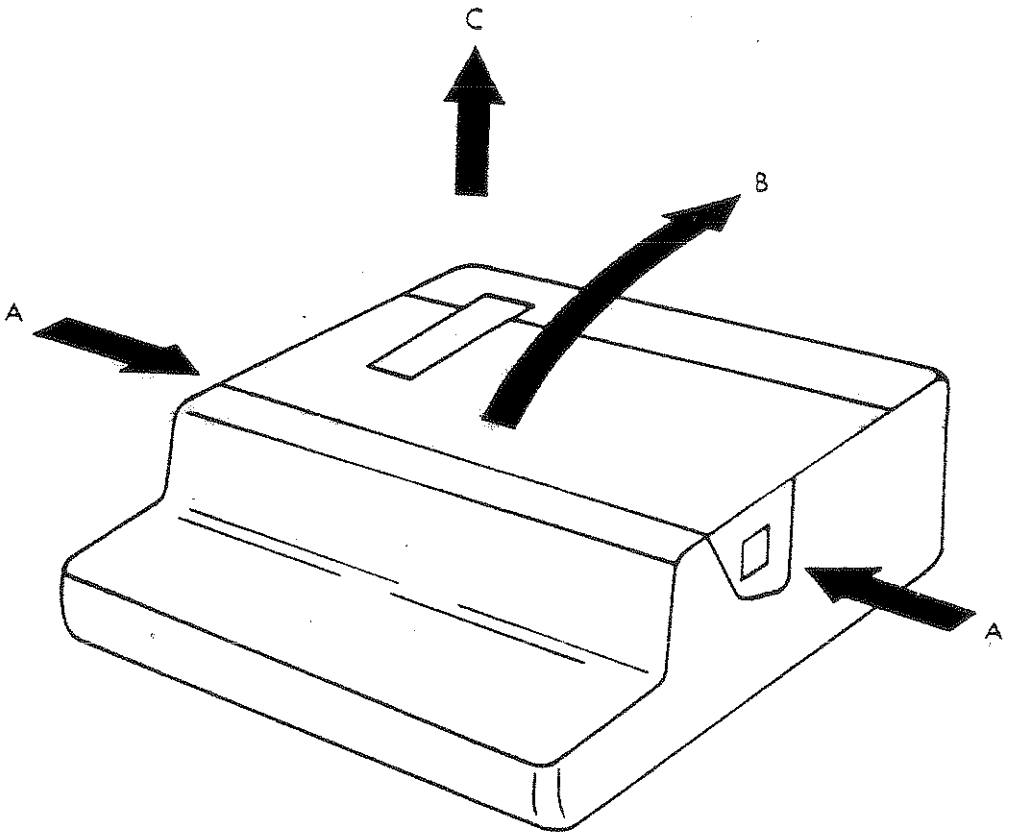
LIST OF TOOLS

Description
. Screwdriver, Allen, M3
. Screwdriver, round, 3 x 100 mm
. Screwdriver, round, 5 x 150 mm
. 0.5 mm shim, round-ended
. 5 unit code rule
. Tweezers
. Open-end wrench, 7 mm

COVER

Removal

- Depress the two buttons in the direction of arrows (A) and raise the COVER LID in the direction of arrow (B).
- Remove the ground connection from PAPER DEFLECTOR.



- Unscrew the two bolts (10) a quarter turn.
- Position the PAPER ADVANCE to the front of the unit.
- Remove the COVER in the direction of arrow (C).

Installation

- Proceed in reverse order of removal, taking care to ensure that the two quarter turn bolts are correctly inserted in their seats.
- Do not forget to reconnect ground to the PAPER DEFLECTOR.

PAPER DEFLECTOR

Removal

- Disconnect the ground wire.
- Remove the PAPER DEFLECTOR.

Installation

- Proceed in reverse order of removal.

FRONT PANEL ASSEMBLY

Removal

- Remove the COVER.
- Rock the FRONT PANEL ASSEMBLY and remove.
- Release the FRONT PANEL ASSEMBLY by pulling the top to the front of the unit.
- Disconnect the ground wire and the following modules :

  . "CLAVIER" board,
  . TAPE READER.

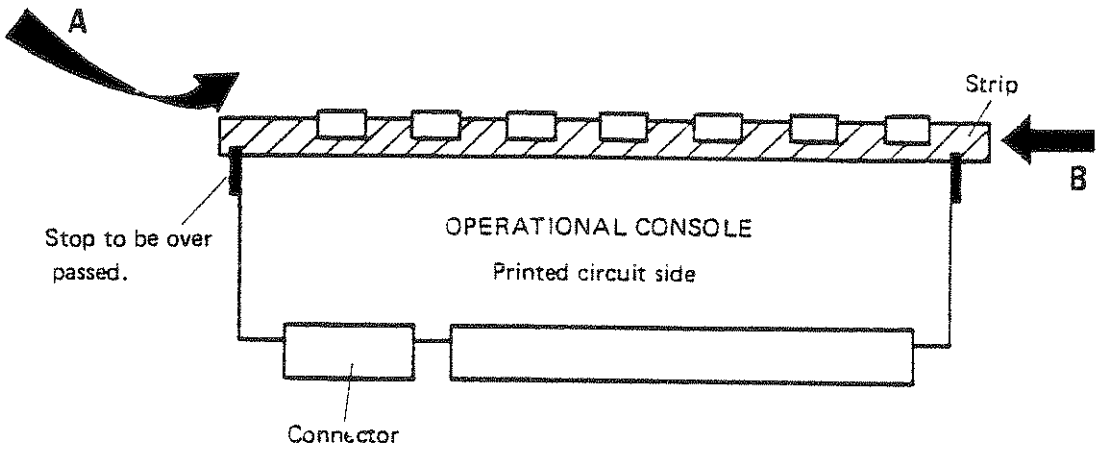
Installation

- Proceed in reverse order of removal.

OPERATIONAL CONSOLE

Removal

- Remove the FRONT PANEL ASSEMBLY.
- Disconnect the OPERATIONAL CONSOLE from the "CLAVIER" board.
- Remove the strip in the direction of arrow (B), after having pulled its left end according to arrow (A).
- Remove the OPERATIONAL CONSOLE.



Installation

- Proceed in reverse order of removal.

PUNCH BACK SPACER

Removal

- Remove the FRONT PANEL ASSEMBLY.
- Press the two attaching pins and release the PUNCH BACK SPACER.
- Remove the PUNCH BACK SPACER.

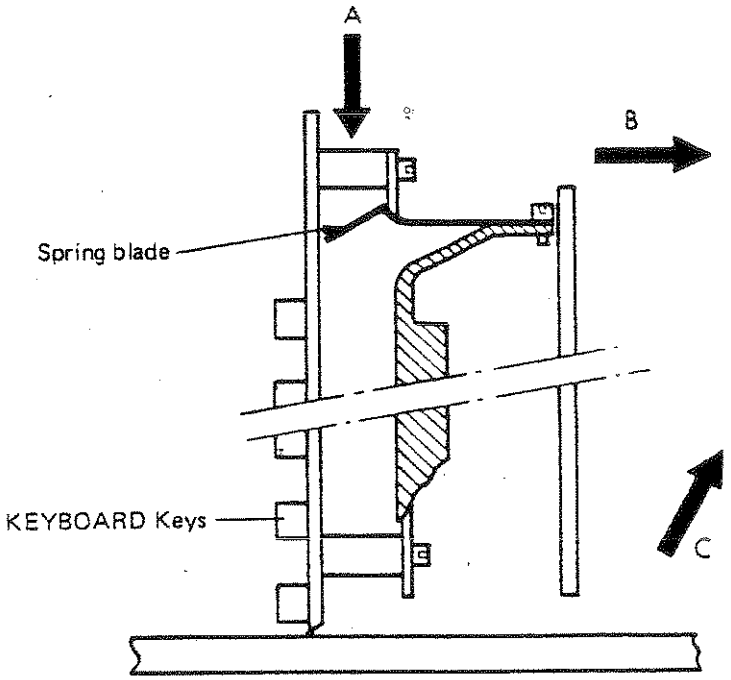
Installation

- Proceed in reverse order of removal.

KEYBOARD

Removal

- Remove the FRONT PANEL ASSEMBLY.
- Disconnect the KEYBOARD from the OPERATIONAL CONSOLE.
- Hold the FRONT PANEL ASSEMBLY vertically (the TAPE READER down).
- Depress the spring blade in the direction of arrow (A) so as to release it from its stop.



- Remove the KEYBOARD in the direction of arrows (B), then (C).

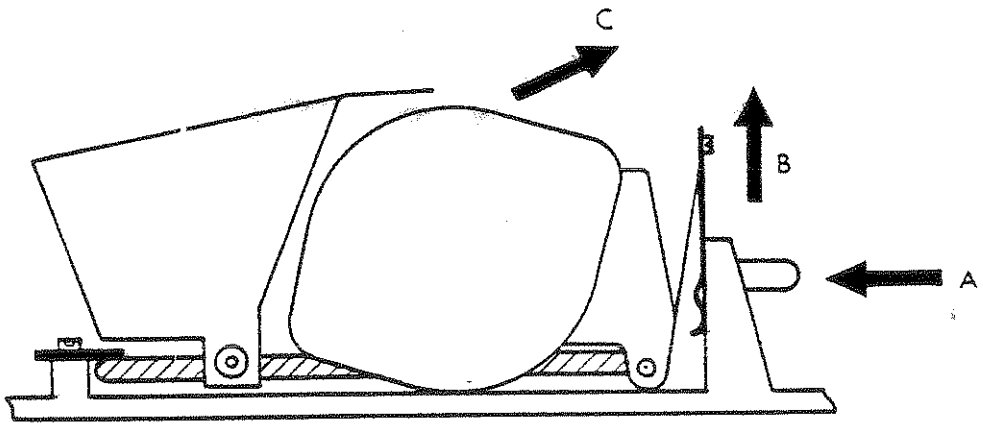
Installation

- Proceed in the reverse order of removal.

TAPE READER

Removal

- Remove the FRONT PANEL ASSEMBLY.
- Disconnect the ground wire from the TAPE READER.
- Place the FRONT PANEL ASSEMBLY vertically.
- Depress the locking pin in the direction of arrow (A) so as to release the spring blade from its seat.
- Remove the TAPE READER in the direction of arrows (B), then (C).



Installation

- Proceed in reverse order of removal.

TAPE PUNCH

Removal

- Remove the FRONT PANEL ASSEMBLY, without disconnection.
- Disconnect the TAPE PUNCH.
- Loosen the two captive attachment screws (6) completely.
- Remove the TAPE PUNCH.

Installation

- Proceed in reverse order of removal.

TAPE STORE

Removal

- Remove the COVER.
- Remove the two attaching screws (3).
- Remove the PAPER DEFLECTOR ground wire.
- Take out the TAPE STORE.
- Disconnect and remove the TAPE STORE.

Installation

- Proceed in reverse order of removal.

NOTE : Take care :

- to correctly insert the bottom of its right-hand plate in its guide,
- to reconnect the PAPER DEFLECTOR ground wire (early version machines only).

TAPE OUT SWITCH

Removal

- Remove the TAPE STORE.
- Remove the connector by squeezing the locking lugs.
- Remove the two attaching screws (26) and the cable clip.
- Remove the TAPE OUT SWITCH, with its cable and connector.

Installation

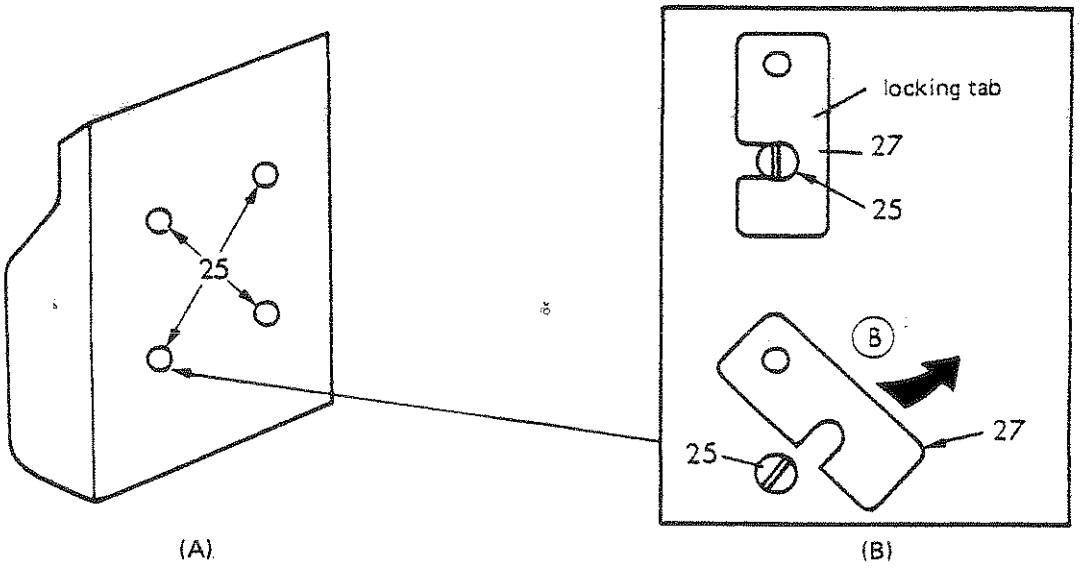
During TAPE OUT SWITCH installation, carry out its adjustment, as follows :

- Install the TAPE OUT SWITCH, with the cable clip, without locking the screws (26),
- Connect an ohmmeter between TAPE OUT SWITCH terminals.
- Set a 65 mm diameter-tape spool, the ohmmeter should indicate that TAPE OUT SWITCH is closed.
- Set a new tape spool, the ohmmeter should indicate that TAPE OUT SWITCH is opened.
- Tighten the two attaching screws (26).

PRINTER

Removal

- Remove the COVER.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the PRINTER (7 connectors).
- Loosen the four PRINTER attaching screws (25) and pivot the locking tabs (27) as shown on figure B , while retaining the PRINTER with one hand.



- Place the unit horizontally.
- Remove the PRINTER.

Installation

- Proceed in reverse order of removal.

PRINTING DEVICE

Removal

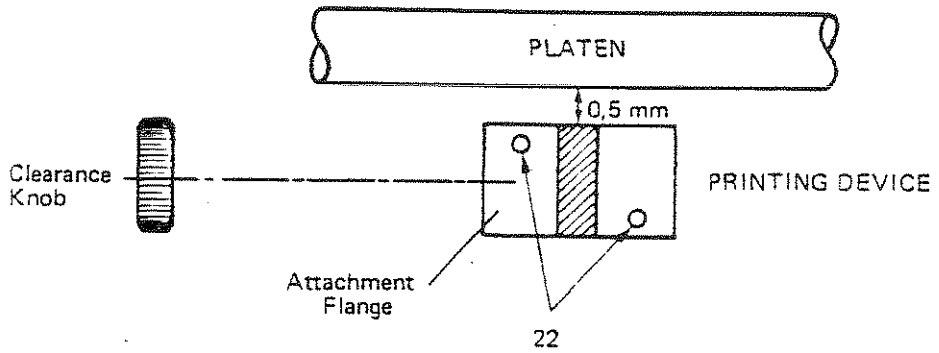
- Remove the COVER.
- Take the ink-ribbon out of the PRINTING DEVICE.
- Disconnect the PRINTING DEVICE (connector (24)).
- Remove the PRINTING DEVICE protective cover (23) by spreading one of its attaching tabs.

CAUTION : DO NOT LOOSEN PAINTED SCREWS.

- Remove the two attaching screws (22) and the attachment flange.
- Remove the PRINTING DEVICE.

Installation

- Proceed in reverse order of removal, but carry out the following adjustment before locking the two attaching screws (22) and installing the ink-ribbon :
  - . turn the PRINTING DEVICE clearance adjustment knob to the smallest clearance position,
  - . adjust the clearance between the PLATEN and the PRINTING DEVICE to 0.5 mm (without paper).



SENSOR

NOTE : New type sensor may be disconnected at the sensor without the removal of the bottom cover.

Removal

- Remove the FRONT PANEL ASSEMBLY.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect SENSOR.
- Remove SENSOR connector from its bracket, by squeezing the attachment lugs.
- Set the unit horizontally.

CAUTION : DO NOT LOOSEN PAINTED SCREWS.

- Loosen the SENSOR shaft clamp screw (8).
- Loosen SENSOR attaching screw (29).
- Remove the SENSOR.

Installation

- Proceed in reverse order of removal.

DRIVE MOTOR* (Type : PANCAKE)

Removal

- Remove the PRINTER.
- Remove DRIVE MOTOR connector from its bracket, by squeezing the attachment lugs.
- Loosen the clamp's screw (2).
- Remove DRIVE MOTOR attaching screw (1).
- Remove the DRIVE MOTOR.

Installation

- Proceed in reverse order of removal.

* NOTE : Removal and installation of DRIVE MOTOR depends on its type.

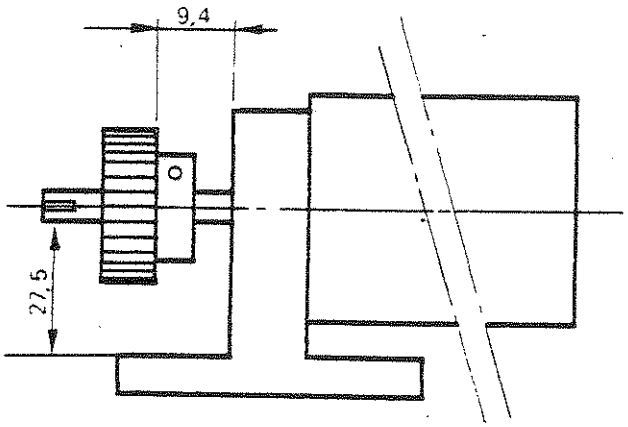
DRIVE MOTOR* (Type : CYLINDRICAL)

Removal

- Remove the PRINTER.
- Remove the SENSOR.
- Remove DRIVE MOTOR connector from its bracket, by squeezing the attachment lugs.
- Loosen the clamp screw (9).
- Remove the two DRIVE MOTOR plate screws (7).
- Remove DRIVE MOTOR and plate assembly.

Installation

- Install DRIVE MOTOR and plate assembly, without locking the three screws (5).
- Adjust the distance between the DRIVE MOTOR shaft and bright part of the casting to 27.5 mm ± 0.1 mm.
- Lock the three DRIVE MOTOR attaching screws (5).
- Install the notch-wheel and adjust the distance between its rear face and the DRIVE MOTOR bracket to 9.4 mm ± 0.5 mm.
- Install the SENSOR.
- Lock the two clamps screws (9 and 29).



*NOTE : Removal and installation of DRIVE MOTOR depends on its type.

RIGHT-HAND RIBBON ASSEMBLY

Removal

- Remove the PRINTER.
- Remove the ink-ribbon and the spools.
- Remove RIGHT HAND RIBBON ASSEMBLY connector from its bracket, by squeezing the two attachment lugs.

- Remove the two RIGHT HAND RIBBON ASSEMBLY attaching screws (12).
- Remove the RIGHT-HAND RIBBON ASSEMBLY.

Installation

- Proceed in reverse order of removal.

LEFT-HAND RIBBON ASSEMBLY

Removal

- Remove the COVER.
- Remove the ink-ribbon and the spools.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the LEFT-HAND RIBBON ASSEMBLY (one connector).
- Remove the LEFT-HAND RIBBON ASSEMBLY connector from its bracket, by squeezing the attachment lugs.
- Place the unit horizontally.
- Remove the attaching screw (4).
- Remove the LEFT-HAND RIBBON ASSEMBLY.

Installation

- Proceed in reverse order of removal.

PLATEN

Removal

- Remove the PRINTER.
- Remove the RIGHT-HAND RIBBON ASSEMBLY.
- Remove the PLATEN attachment device (31) and its two screws.
- Rock the PLATEN out of the belt and remove it.
  The PLATEN is equipped with a notch-wheel and its bearings.

Installation

- Proceed in reverse order of removal.

PAPER ADVANCE

Removal

- Remove the COVER.
- Remove the paper roller.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the PAPER ADVANCE.
- Remove the PAPER ADVANCE connector from its bracket, by squeezing the attachment lugs.
- Place the unit horizontally.
- Lift up, then rock the PAPER ADVANCE in the direction of the KEYBOARD.
- Separate the brackets from their axle by depressing the left-hand end to the inside.
- Remove the PAPER ADVANCE.

Installation

- Proceed in reverse order of removal.

PRESSURE ROLLERS

Removal

- Remove the PAPER ADVANCE.
- Remove the PLATEN, the paper press lever positioned in the direction of the KEYBOARD.
- Remove the two PRESSURE ROLLERS attaching screws (30).
- Remove the PRESSURE ROLLERS.

Installation

- Proceed in reverse order of removal.

PAPER OUT SWITCH

Removal

- Remove the COVER.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the PAPER OUT SWITCH.
- Remove the PAPER OUT SWITCH cable clip.
- Remove the two attaching screws (28).
- Remove the PAPER OUT SWITCH with its cable and its connector.

Installation

During PAPER OUT SWITCH installation, proceed to the following adjustment :

- Install the PAPER OUT SWITCH without locking the two attaching screws (28).
- Connect an ohmmeter between PAPER OUT SWITCH terminals.
- Set a 35 mm diameter-paper roll, the ohmmeter should indicate that PAPER OUT SWITCH is closed.
- Set a new paper roll, the ohmmeter should indicate that PAPER OUT SWITCH is opened.
- Tighten the two attaching screws (28) and proceed in reverse order of removal.

LINE FEED MOTOR

Removal

- Remove the PRINTER.
- Remove the LINE FEED MOTOR connector from its bracket by squeezing the attachment lugs.
- Remove the two LINE FEED MOTOR plate attaching screws (13).
- Rock the LINE FEED MOTOR and plate assembly out of the belt and remove it.
- Loosen the clamp screw (21) and remove the cog-wheel.
- Remove the three LINE FEED MOTOR attaching screws (14).
- Remove the LINE FEED MOTOR.

Installation

- Proceed in reverse order of removal.

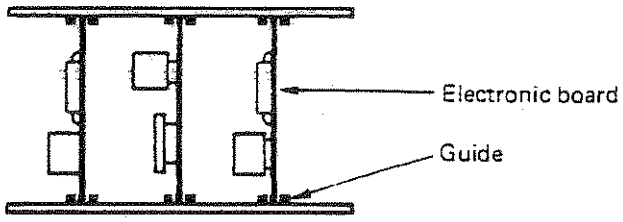
ELECTRONIC BOARDS

Removal

- Remove the COVER.
- Lift the PAPER ADVANCE and position it in the direction of the KEYBOARD.
- Remove the selected board by means of extractors located at upper ends.

Installation

- Proceed in reverse order of removal.
  NOTE : Take care to insert the board in its guides and press home by the extractors.



"ADAPTATION" BOARD

Removal

- Remove the COVER.
- Take out the "ADAPTATION" board.

Installation

- Proceed in reverse order of removal.

MAINS FILTER

Removal

- Remove the mains cable (15).
- Unscrew the three MAINS FILTER captive attaching screws (17).
- Disconnect the MAINS FILTER (one connector).
- Remove the MAINS FILTER.

Installation

- Proceed in reverse order of removal.

LIGHTNING ARRESTOR

Removal

- Pull the lid with the ring.
- Remove the LIGHTNING ARRESTOR ("PARAFOUDRE").

Installation

- Plug-in the "PARAFOUDRE" board by depressing it completely.

TRANSFORMER

Removal

- Remove the COVER.
- Remove the page paper roller.
- Disconnect the TRANSFORMER (two connectors, MAINS FILTER, and ± 12V POWER SUPPLY).
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the TRANSFORMER (two connectors, power supply protection).
- Remove the four TRANSFORMER attaching nuts (19) and their washers, while holding the TRANSFORMER from the unit's upper side.
- Place the unit horizontally.
- Position the PAPER ADVANCE to the front of the unit.
- Remove the TRANSFORMER.

Installation

- Proceed in reverse order of removal.

POWER AMPLIFIER

Removal

- Unscrew the three POWER AMPLIFIER attaching screws (18).
- Rock the POWER AMPLIFIER.
- Disconnect the POWER AMPLIFIER (4 connectors).
- Remove the POWER AMPLIFIER.

Installation

- Proceed in reverse order of removal.

± 12 V POWER SUPPLY

Removal

- Remove the COVER.
- Remove the page paper ROLLER.
- Remove the "ADAPTATION" board.
- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the ± 12 V POWER SUPPLY (2 connectors).
- Place the unit horizontally.
- Unscrew completely the two captive attaching screws (20).
- Remove the ± 12 V POWER SUPPLY.

Installation

- Proceed in reverse order of removal.

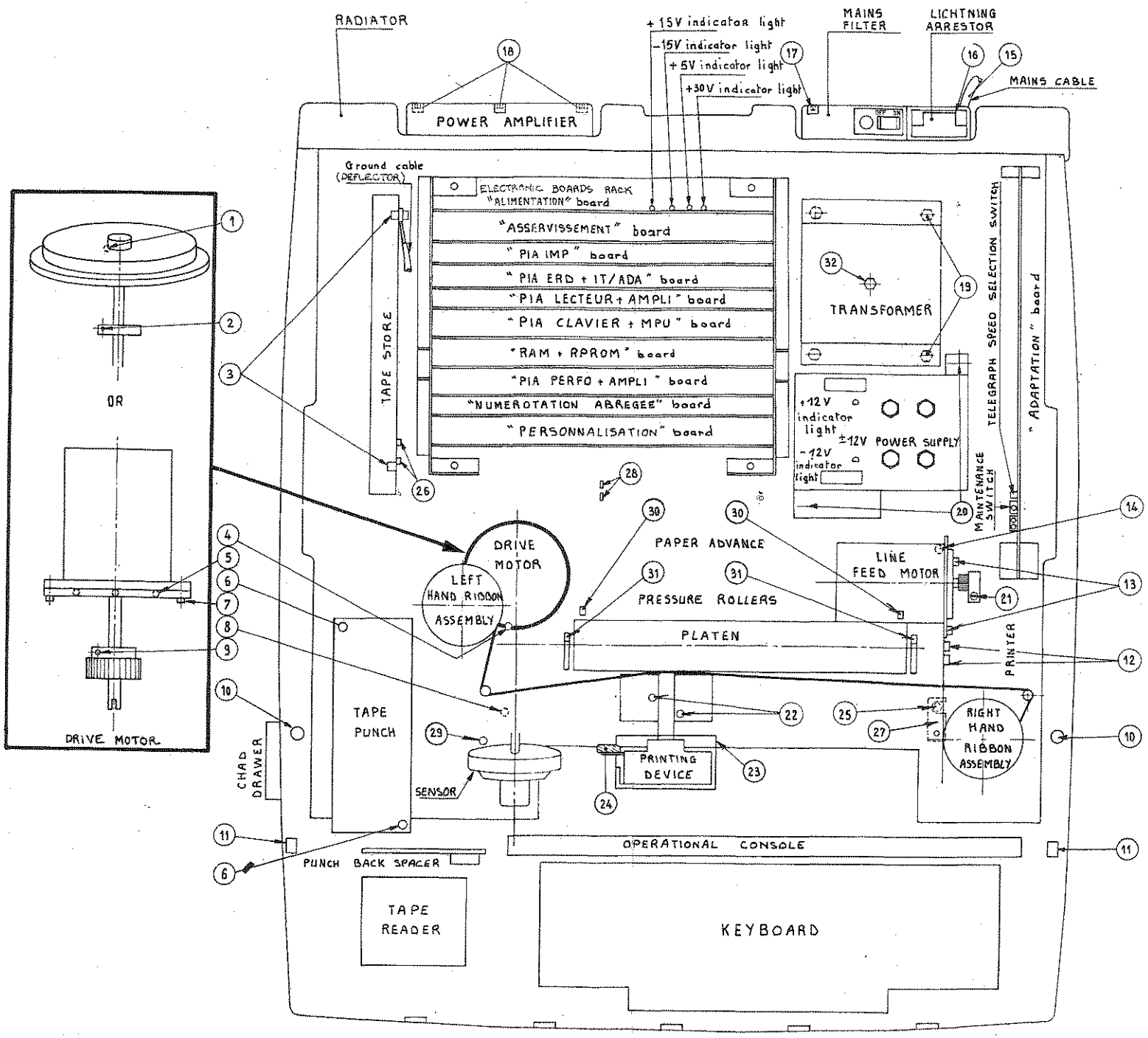
POWER SUPPLY PROTECTION

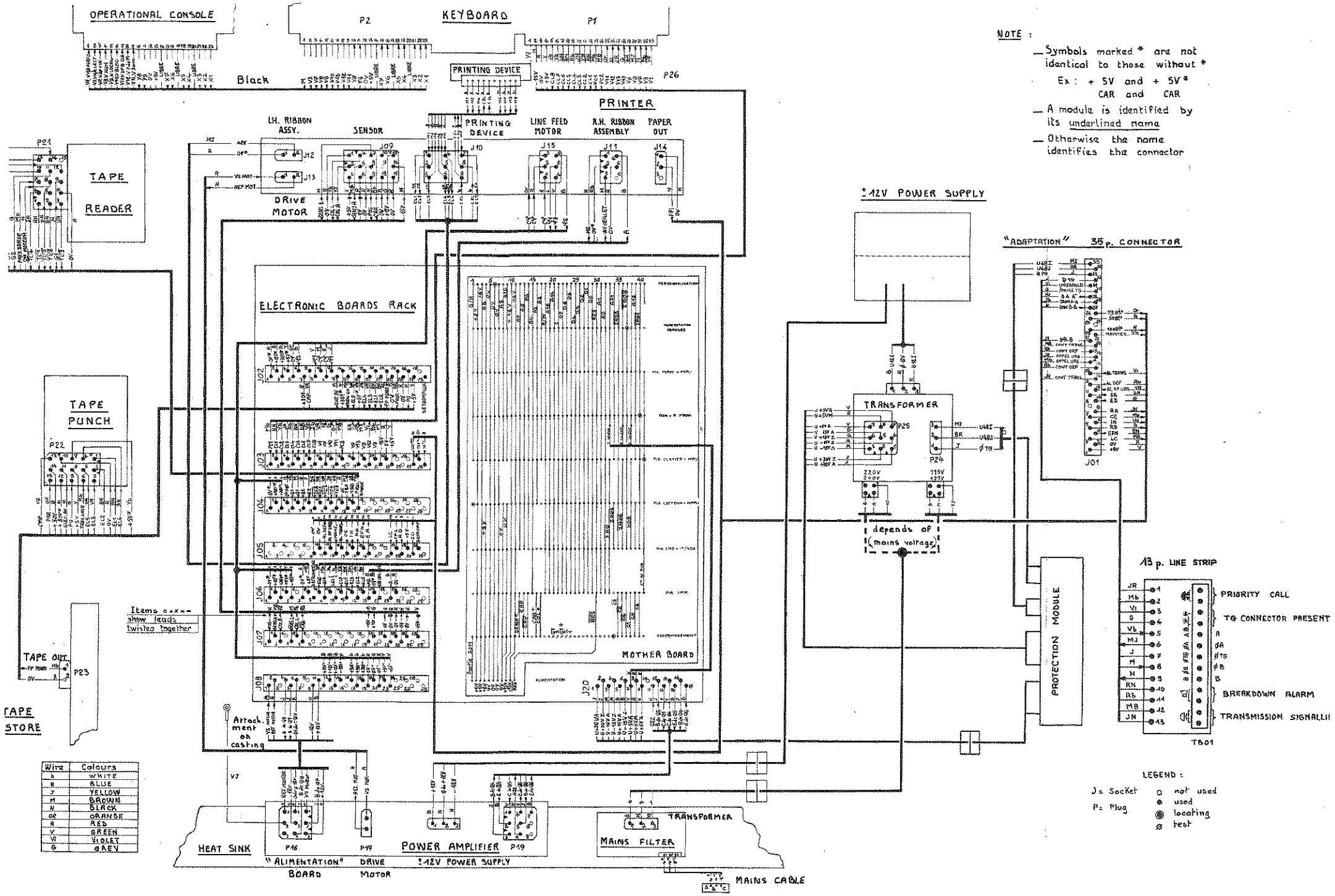
Removal

- Place the unit vertically.
- Remove the unit's lower cover by unscrewing the four captive stands.
- Disconnect the POWER SUPPLY PROTECTION- 4 connectors, i.e. electronic rack, ADAPTATION board and TRANSFORMER (2).
- Remove the two attaching screws.
- Remove the POWER SUPPLY PROTECTION.

Installation

- Proceed in reverse order of removal.


RADIATOR
+15V indicator light
-15V indicator light
+5V indicator light
+30V indicator light
MAINS FILTER
LICHTNING ARRESTOR
MAINS CABLE
POWER AMPLIFIER
Ground cable (DEFLECTOR)
ELECTRONIC BOARDS RACK
"ALIMENTATION" board
"ASSERVISSEMENT" board
" PIA IMP " board
" PIA ERD + IT/ADA " board
"PIA LECTEUR+ AMPLI " board
" PIA CLAVIER + MPU " board
"RAM + RPROM" board
"PIA PERFO + AMPLI " board
"NUMEROTATION ABREGEE" board
" PERSONNALISATION" board
TAPE STORE
TRANSFORMER
±12V indicator light
±12V POWER SUPPLY
-12V indicator light
TELEGRAPH SPEED SELECTION SWITCH
" ADAPTATION " board
MAINTENANCE SWITCH
OR
DRIVE MOTOR
DRIVE MOTOR
LEFT HAND RIBBON ASSEMBLY
PAPER ADVANCE
PRESSURE ROLLERS
PLATEN
LINE FEED MOTOR
PRINTER
TAPE PUNCH
CHAD DRAWER
SENSOR
PRINTING DEVICE
RIGHT HAND RIBBON ASSEMBLY
PUNCH BACK SPACER
OPERATIONAL CONSOLE
TAPE READER
KEYBOARD


OPERATIONAL CONSOLE
P2
KEYBOARD
P1
Black
PRINTING DEVICE
P26
PRINTER
LH. RIBBON ASSY.
SENSOR
PRINTING DEVICE
LINE FEED MOTOR
R.H. RIBBON ASSEMBLY
PAPER OUT
J12
J13
J09
J10
J15
J11
J14
DRIVE MOTOR
VS MOT
REF MOT
P24
TAPE READER
TAPE PUNCH
P22
TAPE OUT
P23
TAPE STORE
ELECTRONIC BOARDS RACK
J02
J03
J04
J05
J06
J07
J08
MOTHER BOARD
J20
Items o x = = show leads twisted together
Attachment on casting
±12V POWER SUPPLY
TRANSFORMER
P25
P24
220V 240V
115V 127V
depends of mains voltage
"ADAPTATION" 35 p. CONNECTOR
J01
PROTECTION MODULE
13 p. LINE STRIP
PRIORITY CALL
TG CONNECTOR PRESENT
BREAKDOWN ALARM
TRANSMISSION SIGNALLII
TB01
NOTE :
— Symbols marked * are not identical to those without *
Ex : + 5V and + 5V*
CAR and CAR
— A module is identified by its underlined name
— Otherwise the name identifies the connector
LEGEND :
J = SocKet
P = Plug
o not used
• used
◉ locating
ø test
Wire Colours
b WHITE
B BLUE
J YELLOW
M BROWN
N BLACK
OR ORANGE
R RED
V GREEN
VI VIOLET
G GREY
HEAT SINK
"ALIMENTATION" BOARD
DRIVE MOTOR
P16
P17
POWER AMPLIFIER P19
±12V POWER SUPPLY
TRANSFORMER
MAINS FILTER
MAINS CABLE

3

ILLUSTRATED CATALOGUE

FOREWORD

1 - DOCUMENT COMPOSITION

The present document includes :

- a plate 00 (zéro) with its text ; this Plate shows the various assemblies likely to be removed in situ,
- an Index of Manufacturers.

2 - PLATE 00 IDENTIFICATION

On Plate 00, each main component is identified by an «item number».

When a main component has several variants, it is identified on Plate 00 with a same item number followed by an alphabetical index proper to each variant.

In the text, some items have their item number preceded by a dash ; in that case, the item is not located on the Plate.

Correspondence of columns on the text

- column 1 : item number on the Plate
- column 2 : SAGEM code
- column 3 : description of part (and eventually its circuit reference)
- column 4 : Manufacturer's reference and Manufacturer's code
- column 5 : quantity

3 - HOW TO USE THE PRESENT DOCUMENT

Knowing an item by its position on equipment, seek out the item No of the main corresponding component, by consulting the Plate 00.

Refer to the «INDEX OF MANUFACTURERS» which gives, according to the Manufacturer's code (column 1), the name and address of Manufacturer (column 2).

NOTE : Electric and electronic components having a circuit reference code, are identified by this code in Plate and text (2nd line of column 3).

4 - REPRESENTATION OF RELATIONSHIP BETWEEN ITEM AND ASSEMBLY

The notion of an item belonging to an assembly appears in the text according to the following principle :

- an item belongs to the assembly immediately above, whose description is shifted by one row to the left,
- an assembly includes all of the items or assemblies immediately «lower», whose description is shifted by one row to the right.

The attaching items are not illustrated and have no special item number. They appear in the text immediately belows the item they attach, and in the same row as this item.

5 - SIGNS AND ABBREVIATIONS

- SB («SUIVANT BESOIN»)

This indicates that the quantity required can only be determined when carrying out maintenance or adjustements.

- ******

This sign in column 2 of parts list means that no spare is provided for this component.

- (R1) A (R4)

Mention in french whose translation is : (R1) TO (R4).

6- ORDER FOR REPLACEMENT PARTS

When ordering a part, please indicate :

- machine name, its reference and serial number (on name plate),
- the part name,
  e.g. : «SPRING»
- the code number, followed of its key,
  e.g. : «23008560-6»

Orders and all related correspondance (enquiries, concerning bills, delivery dates, etc.) should be addressed to :

SAGEM
Département Télex et Bureautique
Service Pièces Détachées
6, avenue d'Iéna
75783 - PARIS-CEDEX 16
Téléphone : 729-10-10 - Télex : 614520F - SAGEM PARIS

Urgent orders may be telephoned or (preferably) telexed to the same address.

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23075300		Memory program 23080967-0	-				
23082130-3		New memory program 23082132-4					
23083000-0		New memory program 23082962-2					
	1	Metal operators panel latch replaced by a plastic one	00				
	3	To introduce SAGEM's motor	00			22000	
	8	Increase insulation of mains wiring					
	15	Change line cord terminating pin					
	18	Operator panel : Plastic designation strip and new glue					
	24	New key board with low keys	00				
	32	New clamp on sensor	00				

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23083000-0	38	Addition of line protection unit 23117527-1	-			45816	
	40	New sensor 23115293-4	00				
23106470-4		New memory program 23106465-0					
23108530-7		New memory program 23108527-9					
23115610-1	44	New memory program (7K) 23115601-5 and transcodeur 23105193-4	-			37969	
23116870-5	46	New "RAM + RPROM" Board 8K 23101491-5 logicial 23115601-5 Transcodeur 23105193-4	00			37969	
	48	"Alimentation" Board 23117707-2	00			49151	
	60	Protection module 23118038-9. Addition of a fuse on all transformer outputs	00				
	63	New "Printer" board 23117644-2	00				

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23116870-5	65	Line protection module add gas arrestors 23117527-1 to 23118719-8	00				
	66	New transformer 23118882-2	00				
	71	New "Alimentation" board 23118723-9					
23128390-3	77	New "RAM + RPROM" board 8K 23118714-3	00				
	82	New "PIA PERFO + AMPLI" board 23119272-7	00				
	83	Copy holder : Improvement of the rigidity					

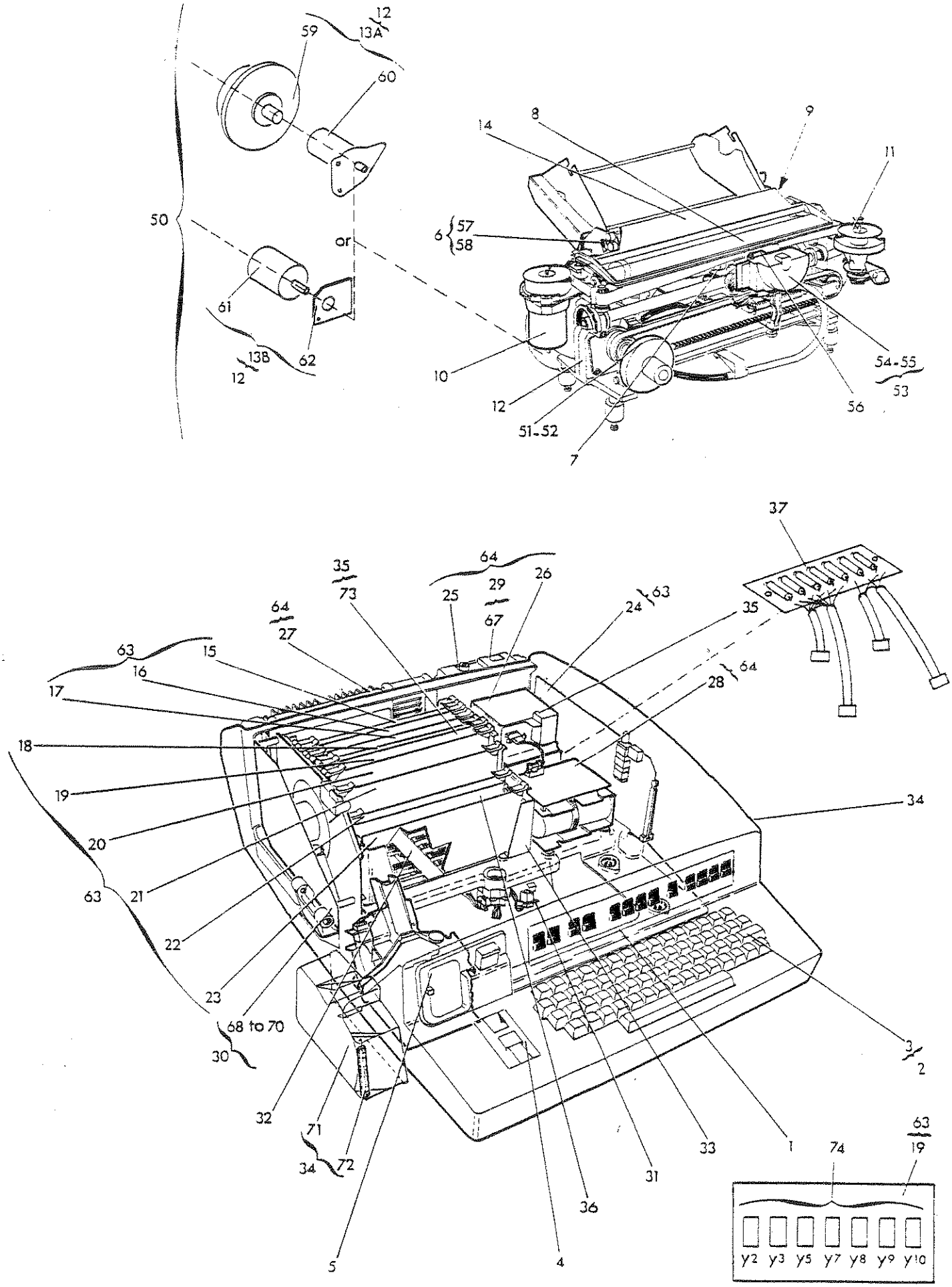


PLATE 00 TELEPRINTER TX20

1	2	3 1 2 3 4 5 6 7	4		5
	**********	TELEPRINTER TX20 (WITHOUT LOGICIAL)	**********		01
1	23074375-7	. OPERATIONAL CONSOLE	23074375-7	53840	01
	23075139-5	. STRIP	23075139-5	53840	01
2A	23074795-8	. KEYBOARD	23074795-8	53840	01
3A	**********	. . CARD KEYBOARD	**********		01
2B	23126742-5	. KEYBOARD	23126742-5	53840	01
3B	**********	. . CARD KEYBOARD	**********	53840	01
4A	23074946-5	. TAPE READER	23074946-5	53840	01
4B	23075697-3	. TAPE READER (WITH TIGHT TAPE DETECTOR)	23075697-3	53840	01
5	23074900-1	. TAPE PUNCH	23074900-1	53840	01
50	23075076-5	. PRINTER	23075076-5	53840	01
	15621044-0	. SCREW C M5X12	E27115C50Q12QEUL	50035	04
51A	23075926-3	. . SENSOR	23075926-3	53840	01
	23074596-2	. . SENSOR FIXING SCREW	23074596-2	53840	01
52	23058757-6	. . CLAMP	23058757-6	53840	01
	15600058-4	. . SCREW CHC M3X16	E27161-30M16QVUL	50035	01
51B	23115293-4	. . SENSOR	23115293-4	53840	01
	23074596-2	. . SENSOR FIXING SCREW	23074596-2	53840	01
52	23058757-6	. . CLAMP	23058757-6	53840	01
	15600058-4	. . SCREW CHC M3X16	E27161-30M16QVUL	50035	01
	23108076-1	. . . SENSOR	23108076-1	53840	01
	23105811-0	. . . CABLE	23105811-0	53840	01
	23109228-7	. . . BRACKET	23109228-7	53840	01
53	23075077-3	. . PRINTING HEAD	23075077-3	53840	01
54	23075238-9	. . . COVER	23075238-9	53840	01
55	23075260-2	. . . INDEX	23075260-2	53840	01
	15690116-6	. . . SCREW CL N02-4.5	E27131-2P45EDTF	50035	01
56	23059763-4	. . CLAMP	23059763-4	53840	01
	15600048-0	. . SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
6	23074800-9	. . PAPER ADVANCE	23074800-9	53840	01
57	23075078-6	. . . PAPER LOW SWITCH AND CORD ASSEMBLY	23075078-6	53840	01
58	23073797-3	. . . SCREW-TAPPED PLATE	23073797-3	53840	01
	15620977-3	. . . SCREW C M2X10	E27115C20Q10CAUP	50035	02
7	23074400-1	. . PRESSURE ROLLERS	23074400-1	53840	01
	15600052-1	. . SCREW CHC M3X10	E27161-30Q10QVUL	50035	02
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	02
8	23074750-2	. . PLATEN	23074750-2	53840	01
	23058916-1	. . CLAMP	23058916-1	53840	02
	15600274-9	. . SCREW CHC M3X20	E27161-30M20QVUL	50035	02
9	23059348-8	. . LINE FEED MOTOR	23059348-8	53840	01
	15600050-0	. . SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	02
10	23079024-3	. . RIBBON ASSEMBLY (LEFT)	23079024-3	53840	01
	15600050-0	. . SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	01
11	23079153-9	. . RIBBON ASSEMBLY (RIGHT)	23079153-9	53840	01
	15600143-7	. . SCREW CHC M3X12	E27161-30Q12QVUL	50035	02
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	02
12	**********	. . PRINTING FRAME	**********		01
13A	23108436-8	. . . DRIVE MOTOR WITH BEARING ASSEMBLY	23108436-8	53840	01
59	23079764-3	. . . . DRIVE MOTOR	23079764-3	53840	01
	15600050-0	. . . . SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
	15700257-4	. . . . WASHER M3U	E27611M30AAUL	50035	01

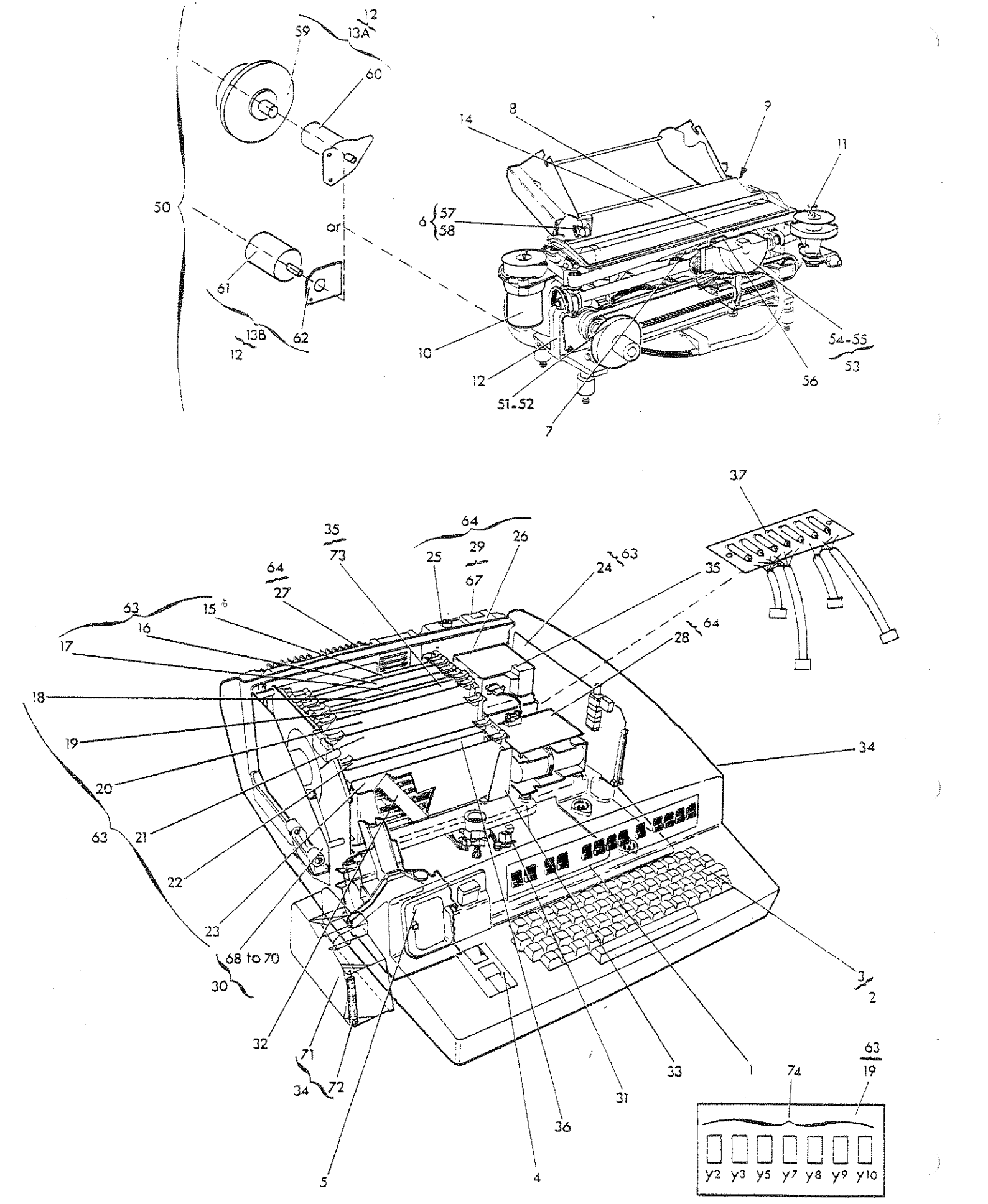


PLATE 00 TELEPRINTER TX20

1	2	3 1 2 3 4 5 6 7	4		5
60	23079763-0	. . . . BEARING ASSEMBLY	23079763-0	53840	01
	15600052-1	. . . . SCREW CHC M3X10	E27161-30Q10QVUL	50035	02
	15700257-4	. . . . WASHER M3U	E27611M30AAUL	50035	02
13B	23108437-1	. . . DRIVE MOTOR WITH SUPPORT BRACKET	23108437-1	53840	01
	15600050-0	. . . SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
61	23077774-5	. . . . MOTOR CABLE	23077774-5	53840	01
62	23076643-7	. . . . BRACKET	23076643-7	53840	01
14	**********	. . MISCELLANEOUS EQUIPMENTS (TELEPRINTER) ...	**********		01
	**********	. MAIN BASE ASSEMBLY	**********		01
63	**********	. . ELECTRONIC BOARDS	**********		01
15A	23074407-2	. . . "ALIMENTATION" BOARD	23074407-2	53840	01
15B	23117707-2	. . . "ALIMENTATION" BOARD	23117707-2	53840	01
15C	23118723-9	. . . "ALIMENTATION" BOARD	23118723-9	53840	01
16	23074415-5	. . . "ASSERVISSEMENT" BOARD	23074415-5	53840	01
17A	23074352-5	. . . "PIA IMP" BOARD	23074352-5	53840	01
17B	23117644-2	. . . "PIA IMP" BOARD	23117644-2	53840	01
18	23074667-0	. . . "PIA ERD+IT/ADA" BOARD	23074667-0	53840	01
19	23073206-9	. . . "PIA LECTEUR+AMPLI" BOARD (WITHOUT .... INTEGRATED CIRCUIT)	23073206-9	53840	01
20A	23074345-0	. . . "PIA CLAVIER+MPU" BOARD	23074345-0	53840	01
20B	23077489-3	. . . "PIA CLAVIER+MPU" BOARD	23077489-3	53840	01
20C	23106892-6	. . . "PIA CLAVIER+MPU" BOARD	23106892-6	53840	01
21A	23074438-7	. . . "RAM+RPROM" BOARD (WITHOUT MEMORIES) ..	23074438-7	53840	01
21B	23101491-5	. . . "RAM+RPROM" BOARD (WITHOUT MEMORIES) ..	23101491-5	53840	01
21C	23118714-3	. . . "RAM+RPROM" BOARD (WITHOUT MEMORIES) ..	23118714-3	53840	01
22A	23073040-3	. . . "PIA PERFO+AMPLI" BOARD	23073040-3	53840	01
22B	23119272-7	. . . "PIA PERFO+AMPLI" BOARD	23119272-7	53840	01
23	23074359-6	. . . "PERSONNALISATION" BOARD	23074359-6	53840	01
24	**********	. . . "ADAPTATION" BOARD (REFER TO SPECIFIC . TECHNICAL)	**********		01
64	**********	. . POWER SUPPLY DEVICES	**********		01
25A	23074393-4	. . . MAINS FILTER	23074393-4	53840	01
	23100155-9	. . . . SCREW M3X25	23100155-9	53840	03
	15700100-1	. . . . WASHER DE3	E27168E30AXTL	50035	03
25B	23100200-6	. . . MAINS FILTER	23100200-6	53840	01
	23100155-9	. . . . SCREW M3X25	23100155-9	53840	03
	15700100-1	. . . . WASHER DE3	E27168E30AXTL	50035	03
- 65	13270088-7	. . . . FUSE CARTRIDGE 1.25A	HA20-1U25	52745	01
	13270072-0	. . . . FUSE CARTRIDGE 0.8A	HA20U8	52745	01
	23100384-2	. . . . WASHER	23100384-2	53840	03
26A	23076906-6	. . . TRANSFORMER	23076906-6	53840	01
	15700315-4	. . . WASHER DD4	E27618D40AXTL	50035	04
	15500022-0	. . . NUT H M4	E27411A40QQFUL	50035	04
26B	23118882-2	. . . TRANSFORMER	23118882-2	53840	01
	15700315-4	. . . WASHER DD4	E27618D40AXTL	50035	04
	15500022-0	. . . NUT H M4	E27411A40QQFUL	50035	04
26C	23142688-9	. . . TRANSFORMER (04-001-96) C.I	23142688-9	53840	01
	15700315-4	. . . WASHER DD4	E27618D40AXTL	50035	04
	15500022-0	. . . NUT H M4	E27411A40QQFUL	50035	04
37	23118038-9	. . . PROTECTION MODULE	23118038-9	53840	01
	15600048-0	. . . SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
27	23074188-6	. . . POWER AMPLIFIER	23074188-6	53840	01
	15600062-5	. . . SCREW CHC M3X25	E27161-30M25QVUL	50035	03
28	23079150-0	. . . +- 12V POWER SUPPLY	23079150-0	53840	01
- 66	13271069-3	. . . . FUSE CARTRIDGE 10A	HA20-10U	52745	02
- 29	**********	. . . "PARAFOUDRE" ASSEMBLY	**********		01
67	23074967-6	. . . . "PARAFOUDRE" BOARD	23074967-6	53840	01
30	23074501-1	. . TAPE STORE	23074501-1	53840	01
	15600143-7	. . SCREW CHC M3X12	E27161-30Q12QVUL	50035	02

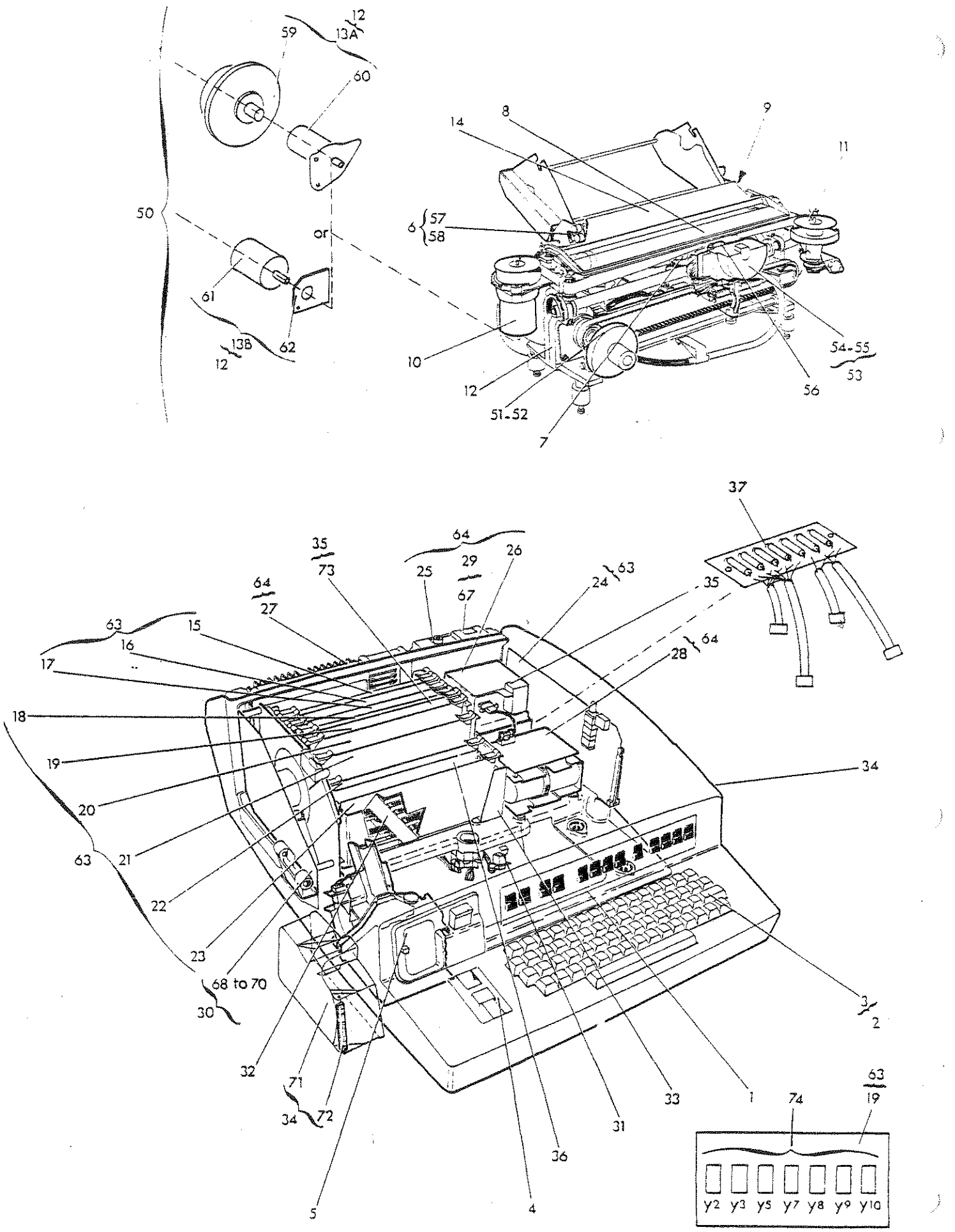


PLATE 00 TELEPRINTER TX20

1	2	3 1 2 3 4 5 6 7	4		5
68	23074527-7	. . . TAPE LOW SNITCH AND CORD ASSEMBLY	23074527-7	53840	01
69	23074726-8	. . . CLAMP	23074726-8	53840	01
70	23073797-3	. . . SCREW-TAPPED PLATE	23073797-3	53840	01
	15621022-6	. . . SCREW C M2X10	E27115C20Q10QEUL	50035	02
31	**********	. . WIRING HARNESS	**********		01
	15600050-0	. . SCREW CHC M3X8	E27161-3008QVUL	50035	07
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	03
32	23100333-4	. . MAIN BASE	23100333-4	53840	01
33	**********	. . MISCELLANEOUS EQUIPMENTS (MAINS BASE)	**********		01
34	**********	. COVER	**********		01
71	23079306-2	. . CHAD BOX	23079306-2	53840	01
72	23079699-8	. . SPRING	23079699-8	53840	01
35	**********	. MISCELLANEOUS EQUIPMENTS (TELEPRINTER WITHOUT LOGICIAL)	**********		01
73	**********	. . INTEGRATED CIRCUIT (ANSWERBACK PROM) OF .. BOARD ITEM 19 (REFERENCE WRITTEN ON ITEM)	**********		01
74	**********	PROMS'SET (BOARD ITEM 21) (REFERENCES WRITTEN ON ITEM)	**********		01
75	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y2	**********		01
76	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y3	**********		01
77	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y5	**********		01
78	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y7	**********		01
79	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y8	**********		01
80	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y9	**********		01
81	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y10	**********		01
- 82	23100262-6	MAINS CABLE	23100262-6	53840	01
36	23102657-7	"NUMEROTAT ON ABREGEE" BOARD (OPTIONAL)	23102657-7	53840	01
- 83	23118719-8	LINE PROTECTION (SEE TECHNICAL SHEET)	23118719-8	53840	01

INDEX OF MANUFACTURERS

1	2
07155	GOODYEAR TIRE AND RUBBER CO 1144 E MARKET AKRON OH 44316 USA
10072	SILEC (STE INDUSTRIELLE DE LIAISONS ELECTRIQUES) SA 64 BD DE MONCEAU 75008 PARIS FRANCE
18767	NATIONAL SEMICONDUCTOR CORP 2900 SEMICONDUCTOR DR SANTA CLARA CA 95051 USA
50023	SAFT (STE DES ACCUMULATEURS FIXES ET DE TRACTION) DPT PILES SAFT LECLANCHE 156 AVENUE DE METZ 93230 ROMAINVILLE FRANCE
50035	AFNOR (ASSOCIATION FRANCAISE DE NORMALISATION) TOUR EUROPE 92080 PARIS LA DEFENSE CEDEX 7 FRANCE
50075	AMP DE FRANCE DIV. AMPLIVERSAL 29 CHAUSSEE JULES CESAR 95301 PONTOISE FRANCE
50095	APEX (L'AMORTISSEUR) 4 RUE DUHESME 75018 PARIS FRANCE
50112	A.D.R. LES APPLICATIONS DU ROULEMENT 1 AVENUE NEWTON 92140 CLAMART FRANCE
50116	APR (APPAREILLAGE PROFESSIONNEL RADIO ELECTRIQUE) ANCIENS ETS JEAN ROGERO 82270 MONTPEZAT DE QUERCY FRANCE
50297	BNAE (BUREAU DE NORMALISATION DE L'AERONAUTIQUE ET DE L'ESPACE) 8 RUE MOREAU VAUTHIER 92100 BOULOGNE BILLANCOURT FRANCE
50537	COMATEL (COMPTOIR EUROPEEN DE MATERIEL ELECTRONIQUE) SA 26500 BOURG LES VALENCES FRANCE
50614	CROUZET SA 128 AVENUE DE LA REPUBLIQUE 75011 PARIS FRANCE
50711	DOMANGE (ETS) SA 198 AV. DES GRESILLONS 92206 ASNIERES FRANCE
50797	SFERNICE (STE FRANCAISE DE L'ELECTRO-RESISTANCE) 59 RUE GUTEMBERG 75737 PARIS CEDEX 15 FRANCE
51148	HEWLETT-PACKARD CO CORPORATE HQ 1501 PAGE MILL RD PALO ALTO CA 94304 USA
51201	INA-ROULEMENTS SA ROUTE DE BITCHE 67501 HAGUENAU FRANCE
51241	JEANRENAUD (DEPARTEMENT ELECTRO COMMUTATION) B.P. 359 39105 DOLE FRANCE
51254	LE JOINT FRANCAIS SARL 10 RUE DE LA BAUME 75008 PARIS FRANCE

1	2
51350	L.C.C.-C.I.C.E. (CIE EUROPEENNE DE COMPOSANTS ELECTRONIQUES) SA 36 AVENUE GALLIENI 93170 BAGNOLET FRANCE
51464	MANUFACTURE FRANCAISE D'OEILLETS METALLIQUES SA 5 RUE DE DUNKERQUE 75010 PARIS FRANCE
51530	MECANINDUS (STE) 54 RUE LOUIS BLANC 92400 COURBEVOIE FRANCE
51596	MICRO SA BOULEVARD DE BORD DEMER PRINCIPAUTE DE MONACO
51689	NOMEL (NOUVEAUTES MECANIQUES ELECTRIQUES) TOUR FRANKLIN CEDEX 11 92081 PARIS LA DEFENCE FRANCE
51747	OEC (OUEST ELECTRONIC CONNECTEURS SA 5 RUE DE LA FAUVETTE 95102 ARGENTEUIL FRANCE
51918	PRONER (ETS) SA B.P. 31 93160 NOISY LE GRAND FRANCE
51950	RADIAL SA 101 RUE PHILIBERT HOFFMANN Z.I. 93110 ROSNY SOUS BOIS FRANCE
51956	R.T.C. LA RADIOTECHNIQUE COUPELEC SA DIV RESISTANCES ET CONDENSATEURS 51 RUE CARNOT 92150 SURESNES FRANCE
52116	SECME (STE D'ETUDES ET DE CONSTRUCTION DE MATERIEL ELECTRONIQUE) SA 88 AVENUE GALLIENI 93170 BAGNOLET FRANCE
52169	SIC-SAFCO (LES CONDENSATEURS) SA 91 RUE DE BELLEVUE 92704 COLOMBES FRANCE
52183	SSC SILICIUM SEMICONDUCTEUR SA 45 RUE DE MONCEAU 75008 PARIS FRANCE
52207	SOCAPEX SA 9 R EDOUARD NIEUPORT 92153 SURESNES FRANCE
52270	SOURIAU ET CIE SA DIVISION CONNEXION ET SPATIAL 13 RUE DU GENERAL GALLIENI 92130 BOULOGNE BILLANCOURT FRANCE
52310	SES (STE ELECTRIQUE STERLING 1 RUE DELEMONT 68300 ST LOUIS FRANCE
52367	TEXAS INSTRUMENTS - FRANCE SA 06270 VILLENEUVE LOUBET FRANCE
52412	TRELEC SARL 2 RUE DE L'AGRICULTURE 95110 SANNOIS FRANCE
52499	VIRAX SA B.P. 197 51321 EPERNAY FRANCE

1	2
52745	UTE (UNION TECHNIQUE DE L'ELECTRICITE) CCTU (COMITE DE NORMALISATION DU COMITE DE COORDINATION DES TELECOMMUNICATIONS) 12 PL DES ETATS UNIS 75783 PARIS CEDEX 16 FRANCE
52746	ACCEL (ACCESSOIRES ELECTRONIQUES) SA 35 RUE DE LA MARE 75020 PARIS FRANCE
52928	RAPID SA 45 , RUE DES DEUX GARES 92504 RUEIL-MALMAISON FRANCE
53072	EUROFARAD SA 92 RUE OBERKAMPF 75011 PARIS FRANCE
53127	HELLERMANN FRANCE SA 34 RUE GAETAN LAMY TOUSSUS LE NOBLE 75530 BUC FRANCE
53573	LOUPOT-CIE (ETS J.) SA ROUTE DE CONCARNEAU 29000 QUIMPER FRANCE
53840	SAGEM SA (STE D'APPLICATIONS GENERALES D'ELECTRICITE ET DE MECANIQUE) 6 AVENUE D'IENA 75783 PARIS CEDEX 16 FRANCE
54330	HARRIS MFG CO INC ST LOUIS MO USA
54515	CLARE INTERNATIONAL NV OVERHAAMLAAN 3700 TONGEREN BELGIQUE
54636	CELDUC (CONSTRUCTION ELECTRIQUES DU CENTRE) SA 42290 SORBIERS FRANCE
55242	COMEPA 34 RUE JACQUART 93500 PANTIN FRANCE
55326	GENERAL ELECTRIC SEMICONDUCTOR PRODUCT DEPARTEMENT ELECTRONICS PARK SYRACUSE NY 13221 USA
55626	INTEL FRANCE 74 RUE D'ARCUEIL 94528 RUNGIS CEDEX FRANCE
56184	METAFIX (STE) SA RUE EUGENE GAZEAU 60300 SENLIS FRANCE
56687	MOTOROLA INC SEMICONDUCTOR PRODUCTS DIV P O BOX 20923 5005 E MCDOWELL RD PHOENIX AZ 85036 USA
56876	TEKELEC-AIRTRONIC B.P.2 92310 SEVRES FRANCE
57249	RIFA SA BOULEVARD DE LA LIANE 62206 BOULOGNE SUR MER FRANCE
59191	FRANCE CONNEXION SARL 14 RUE DE FONTENAY 94300 VINCENNES FRANCE
59582	AMI MICROSYSTEMS 124 AVENUE DE PARIS 94300 VINCENNES FRANCE
59705	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV 464 ELLIS ST MOUNTAIN VIEW CA 94042 USA

1	2
99994	LEGRAND (STE) SA 128 AV MARECHAL DE LATTRE DE TASSIGNY 87011 LIMOGES CEDEX FRANCE
99995	ITT CANNON ELECTRIC 666 E DYER RD SANTA ANA CA 92702 USA
99996	SCHURTER AG H WERKHOFSTER 8 CH 6002 LUZERN LU SUISSE
99997	SGS UNITED KINGDOM LTD PLANAR HOUSE WALTON STREET AYLESBURY BUCKS UNITED KINGDOM
99998	S S S SOLID STATE SCIENTIFIC, INC., MONTGOMERYVILLE INDUSTRIAL CENTER. MONTGOMERYVILLE PA 18936 USA
99999	SCHNORR, ADOLF, KG 7434 MAICHINGEN STUTTGARTER STRASSE RFA

TELEPRINTER

TX 20

WORKSHOP TECHNICAL DOCUMENT

TECHNICAL DESCRIPTION

MAINTENANCE MANUAL

ILLUSTRATED PARTS CATALOGUE

SAGEM

TELEPRINTER TX 20

FOREWORD

The present Workshop Technical Document covering the TX 20 Teleprinter consists of three parts :

1 - Technical description

2 - Maintenance manual

3 - Illustrated parts catalogue

This document is a complement to the Field Maintenance Manual of the TX20 Teleprinter.

NOTA

This document cancels and replaces the Workshop Technical Document SA 10626

1

TECHNICAL DESCRIPTION

FOREWORD

The present TECHNICAL DESCRIPTION is only a support to understand the schematic diagrams.

In theory, the basic texts refer to the first version of the analysed board (Example : First block diagram of «PIA CLAVIER + MPU» board).

The «complementary data» refer to the second, third..... block diagram of the same board.

Therefore, differences of CIRCUIT REFERENCES can appear between the text and the various block diagrams.

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DRAWINGS

Schematic diagram

DRAWING 1 - "OPERATIONAL CONSOLE" board

DRAWING 2 - "KEYBOARD" board

DRAWING 3 - "ALIMENTATION" board (and POWER AMPLIFIER)

DRAWING 4 - "ASSERVISSEMENT" board

DRAWING 5 - "PIA IMP" board

DRAWING 6 - "PIA ERD + IT/ADA" board

DRAWING 7 - "PIA LECTEUR + AMPLI" board

DRAWING 8 - "PIA CLAVIER + MPU" board

DRAWING 9 - "RAM + RPROM" board

DRAWING 10 - "PIA PERFO + AMPLI" board

DRAWING 11 - "NUMEROTATION ABREGEE" board

DRAWING 12 - "PERSONNALISATION" board

DRAWING 13 - $\pm$ 12 V POWER SUPPLY

DRAWING 14 - MAINS FILTER and "PARAFOUDRE" board

DRAWING 15 - SYNCHRONIZATION DEVICE (TAPE PUNCH)

1 – UNIT CONTROL LOGIC

1.1 GENERAL

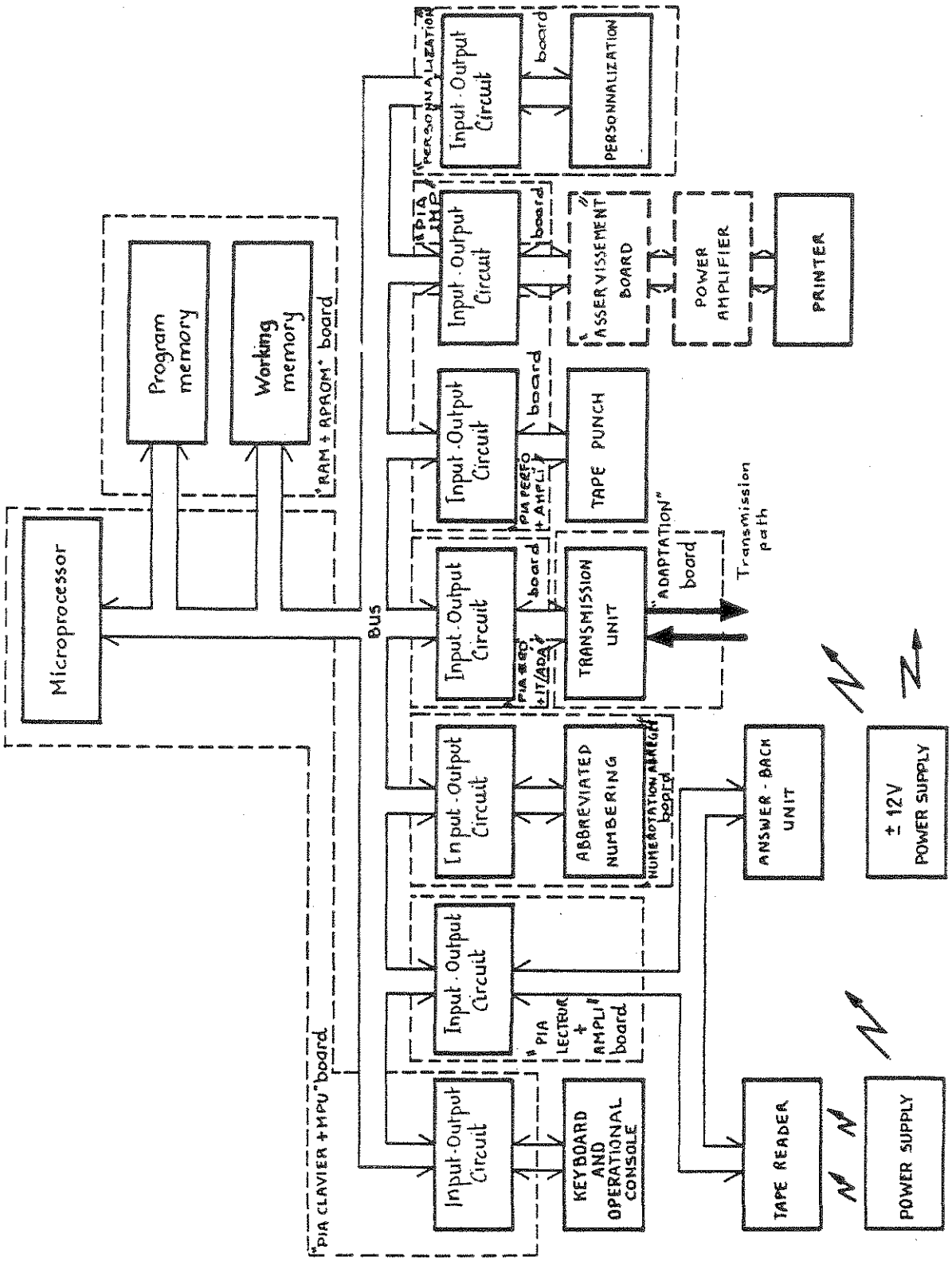
The control logic consists of :

- a microprocessor,
- a program memory,
- a working memory,
- module input-output circuits.

The control logic has the following basic purposes :

- testing and recognising MODULE statuses,
- according to these statuses, generating control sequences relative to the MODULES,
- respecting the hierarchies that exist between MODULES,
- ensuring data transfers from input MODULES to the relative output MODULES,
- temporarily storing incoming data when the output MODULE being addressed is not ready to receive it,
- ensuring data sequencing according to the incoming data and their origins,
- identifying characters or sequences of characters in the incoming data,
- according to these sequences and the origin of the data, generating MODULE remote control orders,
- counting characters belonging to code sub-assemblies and generating orders according to the count made,
- code-converting of incoming data prior to transfer towards certain MODULES.

LOCATION OF FUNCTIONS IN MODULES



Module	Location of associated electronics
OPERATIONNAL CONSOLE	"PIA CLAVIER + MPU" board "PERSONNALISATION" board "RAM + RPROM" board
KEYBOARD	"PIA CLAVIER + MPU" board
ANSWER-BACK UNIT	"PIA LECTEUR + AMPLI" board "PERSONNALISATION" board "RAM + RPROM" board
TAPE READER	"PIA LECTEUR + AMPLI" board "RAM + RPROM" board
TAPE PUNCH	"PIA PERFO + AMPLI" board "PERSONNALISATION" board "RAM + RPROM" board
TAPE STORE	"PIA PERFO + AMPLI" board
PRINTER, consisting of :	
. PRINTING DEVICE	"PIA IMP" board
. SENSOR	"ASSERVISSEMENT" board
. DRIVE MOTOR	POWER AMPLIFIER "ALIMENTATION" board "ASSERVISSEMENT" board
. PAPER ADVANCE	"PIA ERD + IT/ADA" board
. LINE FEED MOTOR	"PIA PERFO + AMPLI" board "PERSONNALISATION" board
. RIBBON ASSEMBLY (LEFT)	"PIA IMP" board
. RIBBON ASSEMBLY (RIGHT)	"PIA IMP" board "PIA PERFO + AMPLI" board "PIA ERD + IT/ADA" board
"NUMEROTATION ABREGEE"	"PIA CLAVIER + MPU" board
TRANSMISSION UNIT	"PIA ERD + IT/ADA" board "ADAPTATION" board
Power supply	POWER AMPLIFIER "ALIMENTATION" board + 12 V POWER SUPPLY TRANSFORMER MAINS FILTER "PARAFOUDRE" MAINS CABLE "RAM + RPROM" board

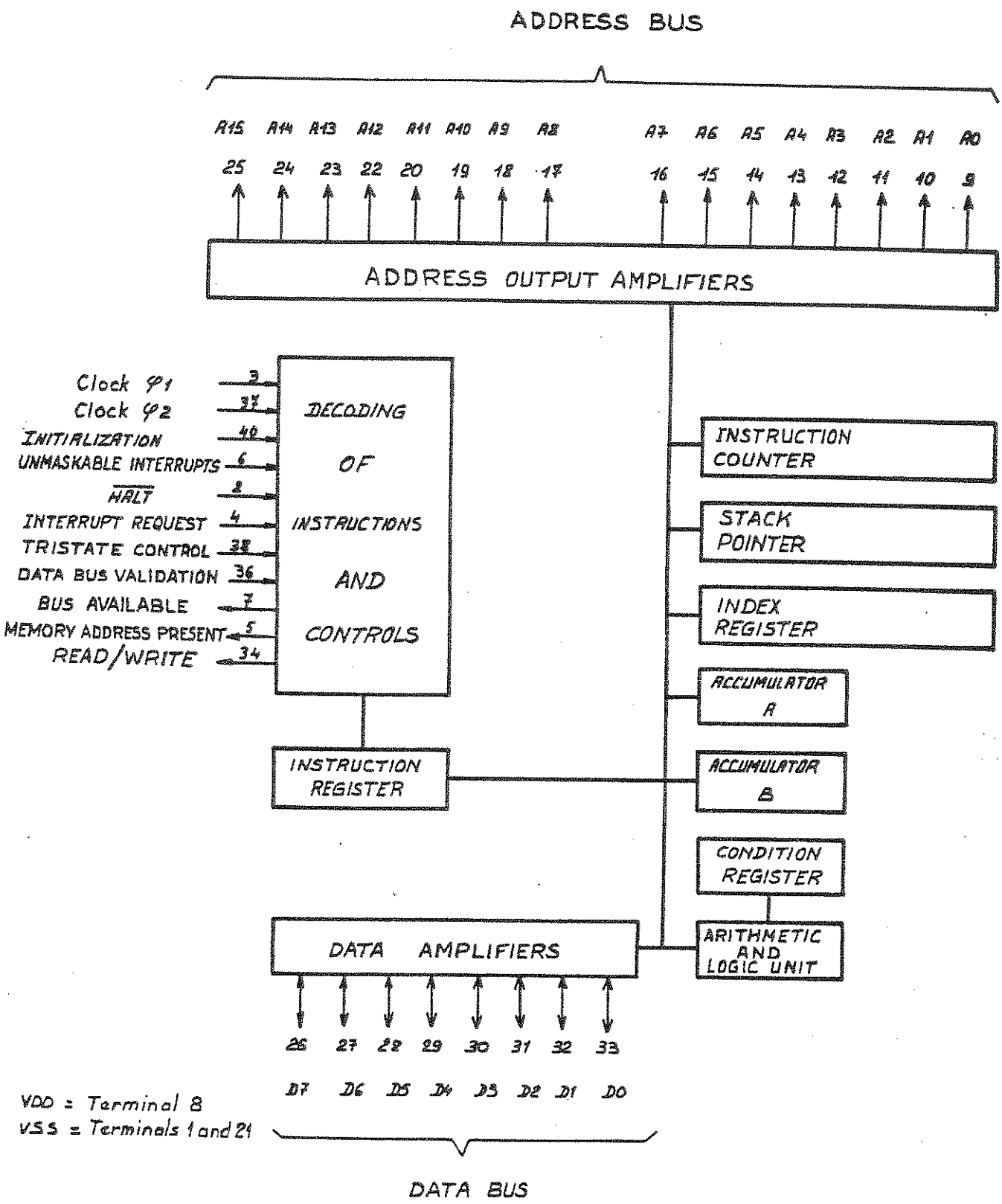

ADDRESS BUS
A15 A14 A13 A12 A11 A10 A9 A8 A7 A6 A5 A4 A3 A2 A1 A0
25 24 23 22 20 19 18 17 16 15 14 13 12 11 10 9
ADDRESS OUTPUT AMPLIFIERS
Clock φ1 3
Clock φ2 37
INITIALIZATION 40
UNMASKABLE INTERRUPTS 6
HALT 8
INTERRUPT REQUEST 4
TRISTATE CONTROL 38
DATA BUS VALIDATION 36
BUS AVAILABLE 7
MEMORY ADDRESS PRESENT 5
READ/WRITE 34
DECODING OF INSTRUCTIONS AND CONTROLS
INSTRUCTION REGISTER
INSTRUCTION COUNTER
STACK POINTER
INDEX REGISTER
ACCUMULATOR A
ACCUMULATOR B
CONDITION REGISTER
ARITHMETIC AND LOGIC UNIT
DATA AMPLIFIERS
26 27 28 29 30 31 32 33
D7 D6 D5 D4 D3 D2 D1 D0
VDD = Terminal 8
VSS = Terminals 1 and 21
DATA BUS

Figure 1 General structure of microprocessor

1.2 CHARACTERISTICS OF MICROPROCESSOR

1.2.1 General structure (see figures 1 and 2)

The microprocessor is an 8-bit word wired control microprocessor addressing a 64 k word capacity memory and having peripherals comprising :

- one instruction counter (16 bits),
- one stack pointer (16 bits),
- one index register (16 bits),
- two 8-bit accumulators A and B,
- one 6-bit condition register.

1.2.2 Addressing

The microprocessor has 7 addressing modes :

- accumulator addressing : one of the two accumulators A or B is specified in the instruction (one 8-bit byte),
- immediate addressing : the operand is contained in the instruction (two or three 8-bit bytes),
- direct addressing : these two-byte instructions are used for addressing the first 256 bytes of the memory,
- extended addressing : these three-byte instructions are used for addressing the entire memory,
- indexed addressing : these two-byte instructions are used for addressing the 256-byte location identified by the index register,
- implicit addressing : these one byte instructions relate to the stack or the internal registers,
- relative addressing : these two-byte instructions are used for addressing between 126 and + 129 bytes with respect to the instruction counter (conditional branching).

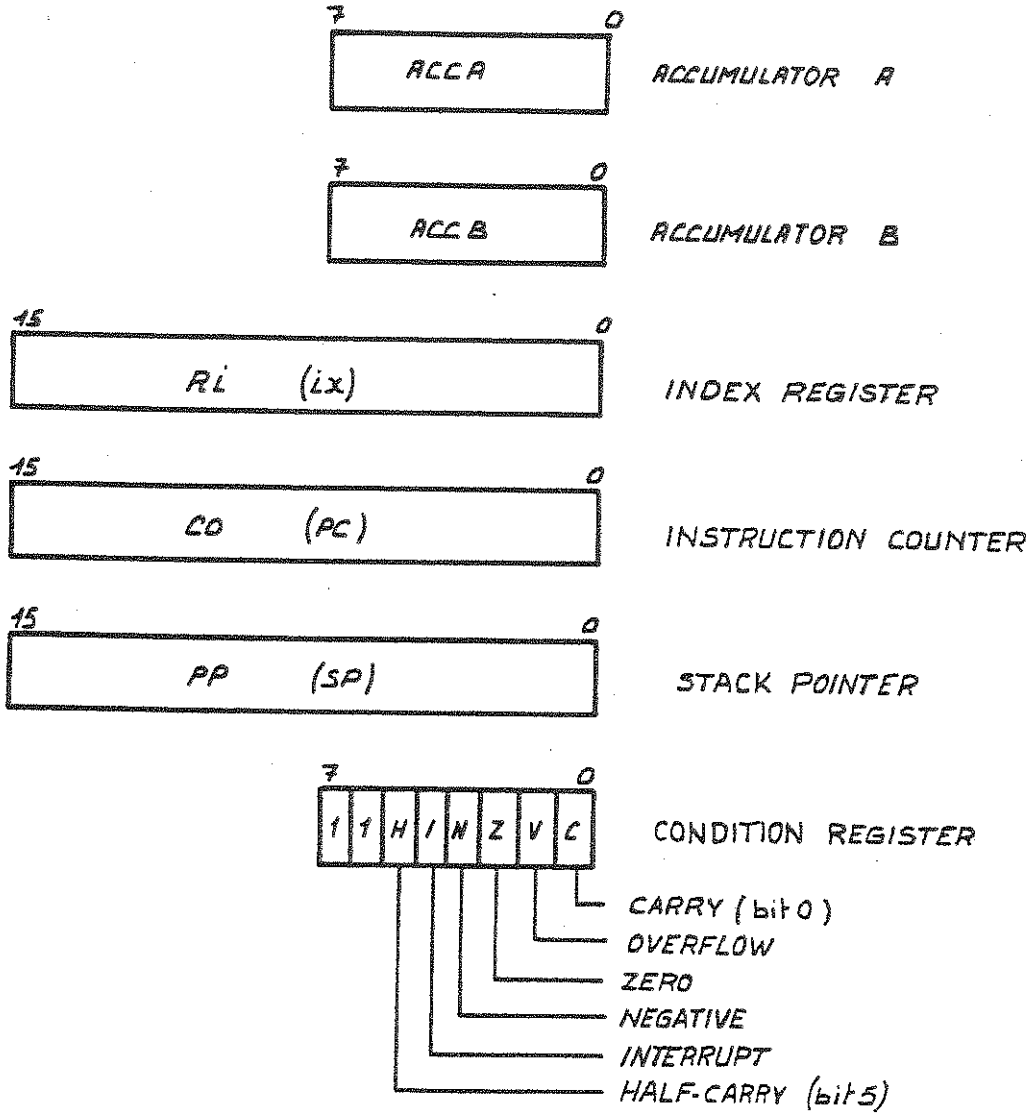


Figura 2 General structure of microprocessor

1.2.3. Instruction set

The instruction set comprises 72 instructions :

- memory or accumulator reference instructions : 30
- instructions concerning the index register and stack handling : 11
- conditional branching and jump instructions : 23
- instructions relative to the condition register : 8

In particular, the instruction set includes :

- program sequencing instructions : conditional jumps, sub-routine call instructions with automatic protection of the instruction counter in the stack and a sub-routine return instruction with automatic restoration of the instruction counter,
- context change instructions : call supervisor, change and store instruction counter and return instructions with automatic context restoration,
- instructions relating to the stack.

1.2.4 Interrupts

There are three types of interrupts available :

- maskable interrupt,
- unmaskable interrupt,
- software interrupt.

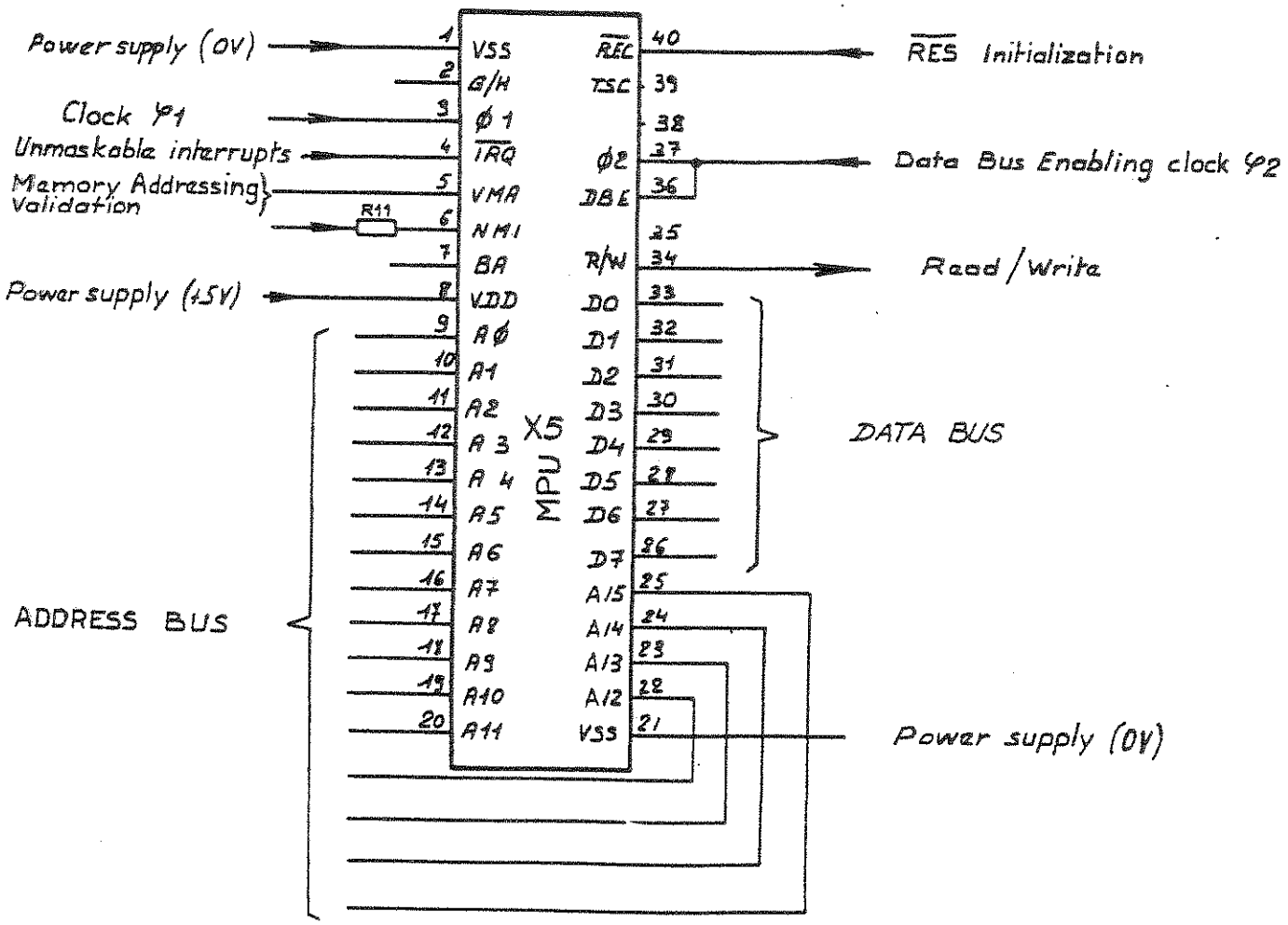
The interrupts are managed automatically with protection of the context in the stack and connection to the addresses contained in a fixed memory location.

1.3 OPERATION OF MICROPROCESSOR

("PIA CLAVIER + MPU" board)

The microprocessor (X5) requires a + 5 V power supply for VDD (0 V for VSS, two terminals) and a two phase clock consisting of signals $\varphi 1$ and $\varphi 2$ wich are in phase-opposition (see paragraph : time base).

The "$\overline{RES}$" initialization signal appearing at ($\overline{REC}$) and coming from the "ALIMENTATION" board can be used for disabling the microprocessor (X5) during switching on or in the event of a brief break in the mains. The Memory Addressing Validation signal "VMA" is used for generating the Enabling signal "E" (see paragraph : time base). All the unmasked interruptions coming from the various input/output circuits of the unit appear at terminal ($\overline{IRQ}$). The address bus consists of a group of 16 wires in parallel (A0 to A15). The data bus, consisting of 8 wires (D0 to D7) is validated by the $\varphi 2$ clock also wired on the Data Bus Enabling (DBE) input. The microprocessor generates the Read/Write signal "R/W" allowing dialogue between the microprocessor and the unit input-output circuits via buses.

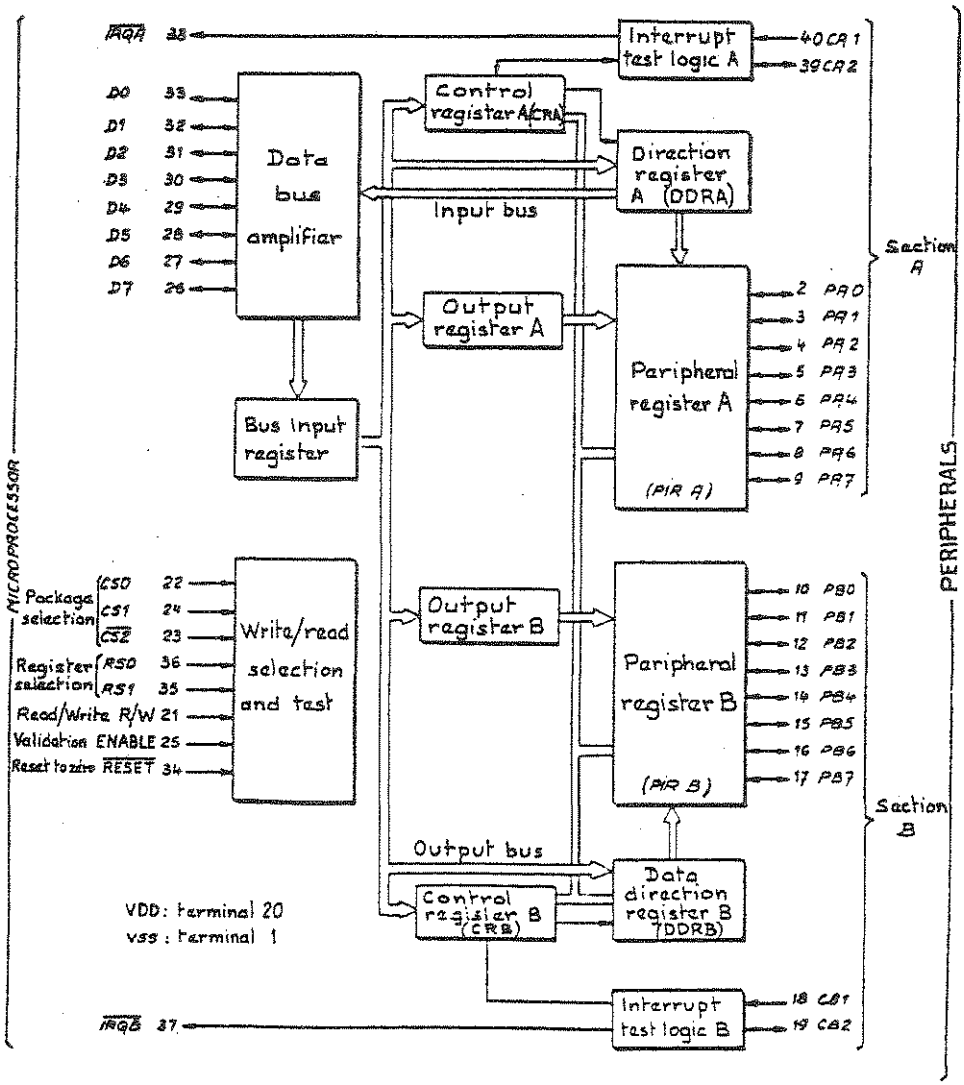


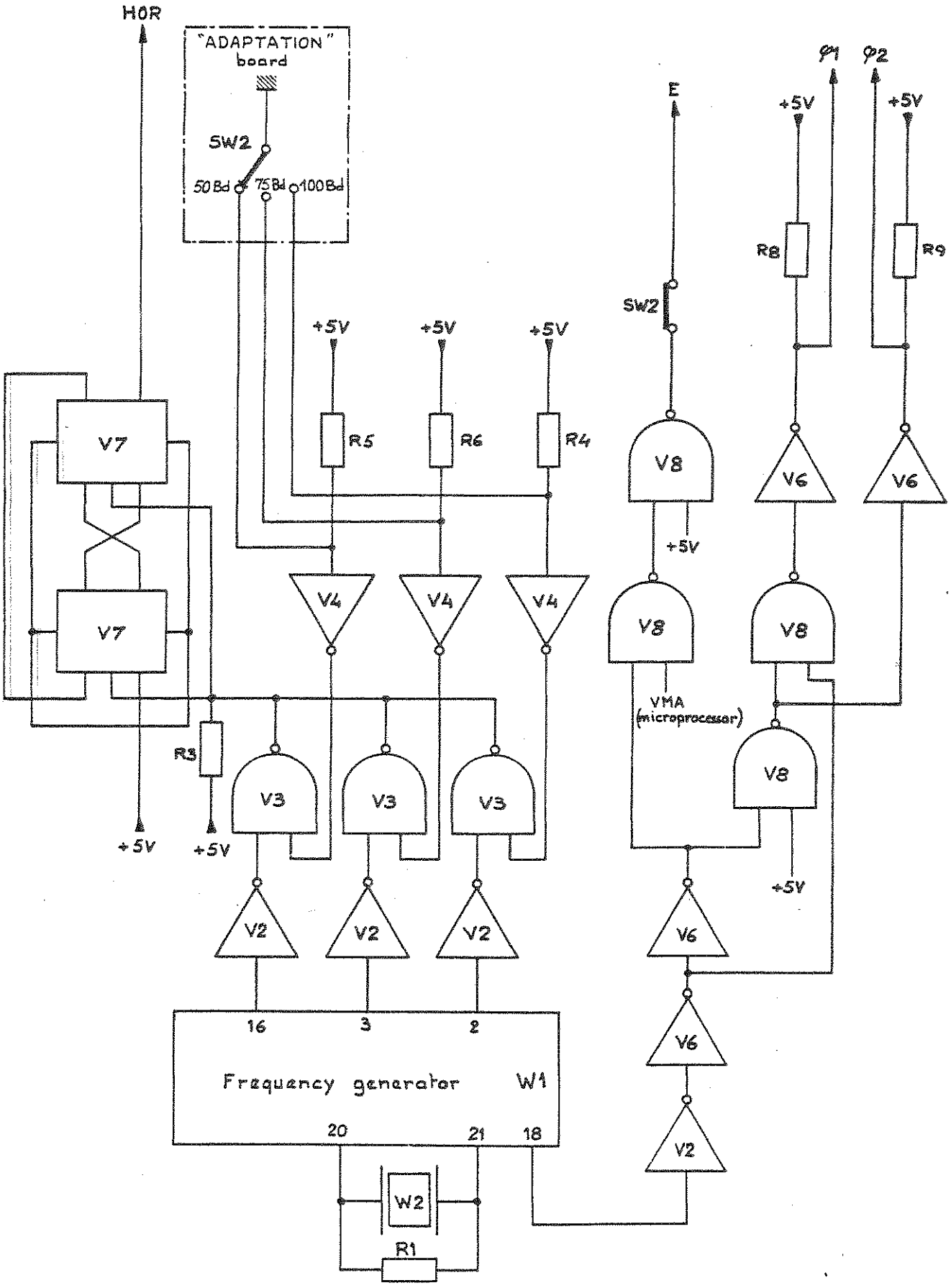
1.4 CHARACTERISTICS OF INPUT-OUTPUT CIRCUIT

General structure

The PIA input-output circuit consists of :

- a bidirectional bus for transfers to and from the microprocessor,
- two 8-wire bidirectional buses for transfers to and from the peripherals,
- two peripheral registers (PIRA and PIRB),
- two programmable control registers (CRA and CRB),
- two operating direction definition registers for each of the wires on the two peripheral transfer buses (Data Direction Registers DDRA and DDRB),
- four interrupt input lines which can be checked individually (CA1, CA2, CB1, CB2). Two of them (CA2, CB2) can also be used as peripheral control output lines.




HOR
"ADAPTATION" board
SW2
50 Bd
75 Bd
100 Bd
+5V
+5V
+5V
R5
R6
R4
V7
V7
V4
V4
V4
R3
V3
V3
V3
+5V
+5V
V2
V2
V2
16
3
2
Frequency generator
W1
20
21
18
W2
R1
E
SW2
V8
+5V
V8
V8
VMA (microprocessor)
V8
+5V
V6
V6
V6
V6
V2
φ1
φ2
+5V
+5V
R8
R9
V6
V6

Time base

1.5 TIME BASE

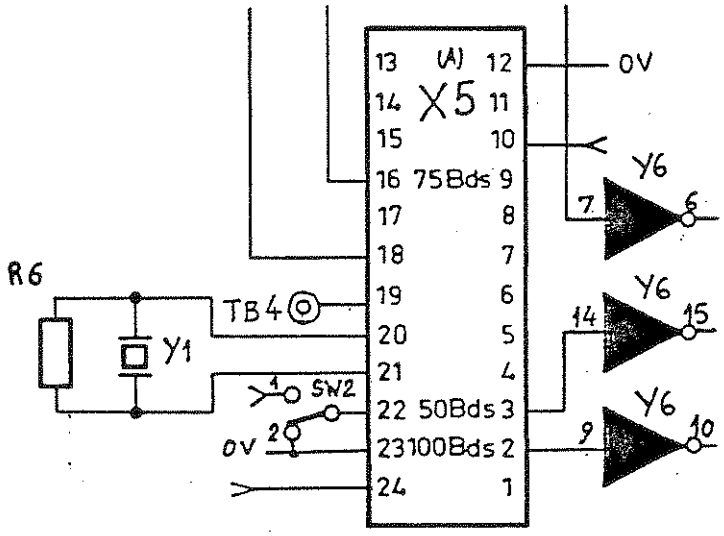
("PIA CLAVIER + MPU" board)

The time base of the unit consists of a frequency generator (W1) ("PIA-CLAVIER + MPU" board) controlled by a crystal (W2).

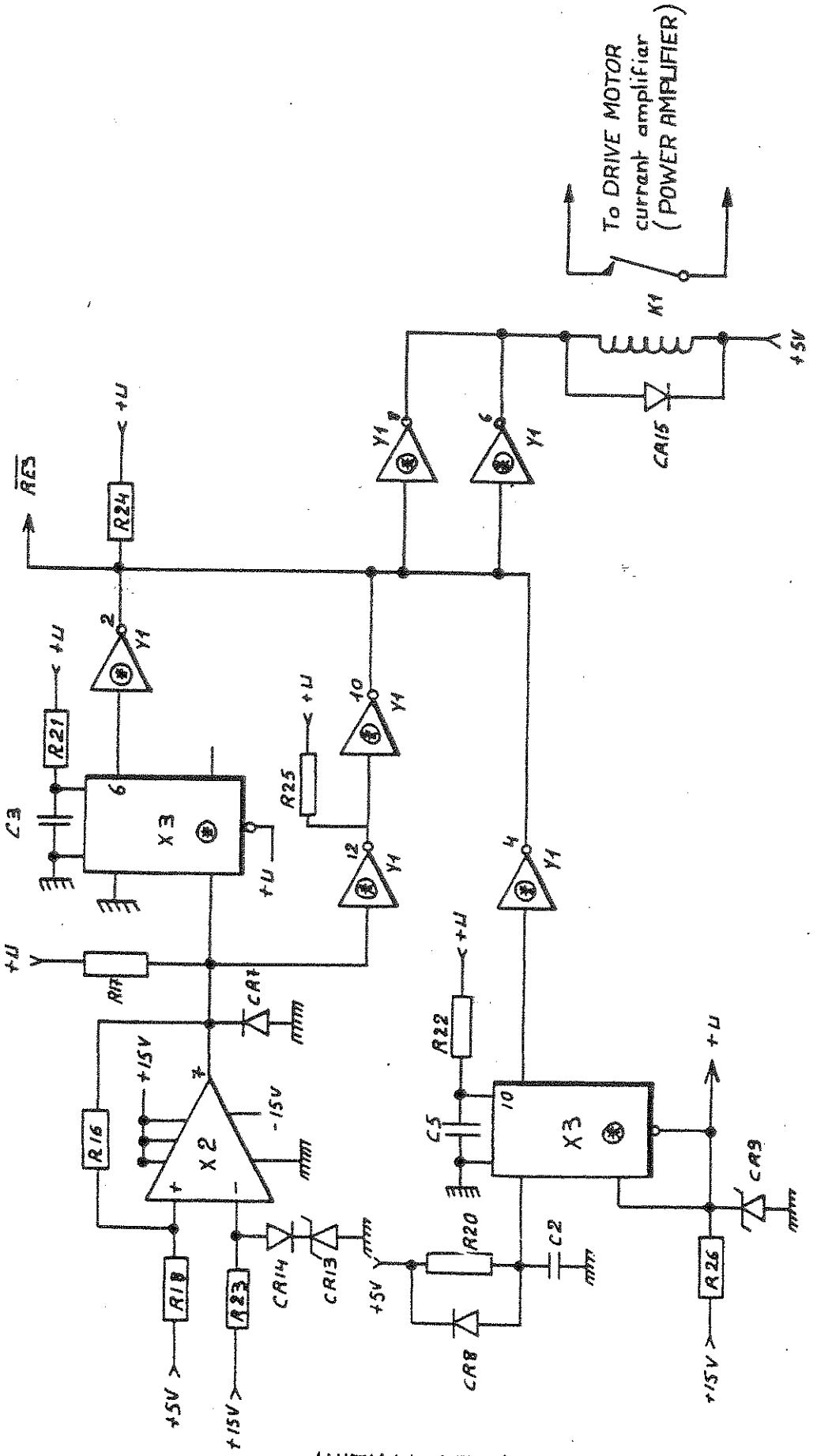
Three outputs of the frequency generator are used for obtaining the clock signals corresponding to telegraph speed of 100 bauds, 75 bauds and 50 bauds. The selection of the telegraph speed used is obtained by switch (SW2), located on the "ADAPTATION" board, the logic gates assembly (V2, V3 and V4) and the resistors (R4, R5 and R6). The signal resulting from the selection is then divided by three by a group of flip-flops (V7) which furnish the clock signal (HOR) necessary for operating the general-purpose asynchronous transmitter-receiver circuit UART (Y2) ("PIA ERD + IT/ADA" board).

The two clock signals (φ1 and φ2) required for the operation of the microprocessor (X5), are also generated by the frequency generator (W1). Signals φ1 and φ2 are brought into phase opposition by a group of logic gates and inverters (V6 and V8). The Validation of Memory Addressing signal "VMA" from the microprocessor (X5) inhibits the Enabling signal "E". Switch (SW2) opens the "E" signal circuit in order to test the input-output circuit (Y2) of the KEYBOARD when using the test set EMP-2

1.5.1 Complementary data



The switch (SW2) allows a margin $\geqslant$ 45 %



(*) +U power supply

INITIALIZATION CIRCUIT

1.6 INITIALIZATION CIRCUIT

(«ALIMENTATION» board, plates 3-1, 3-2)

The initialization circuit is used for two purposes :

- firstly, applying a pulse, active at level zero, for resetting an initial state at "$\overline{RES}$" (restart) for the microprocessor and the input-output circuits in the following cases :

  . switching on of the unit,

  . brief break in power supply voltage,

  . drop in power supply voltage beyond tolerance provided for,

- then, inhibiting the DRIVE MOTOR amplifier during the initialization signal.

1.6.1 Operation during switching on

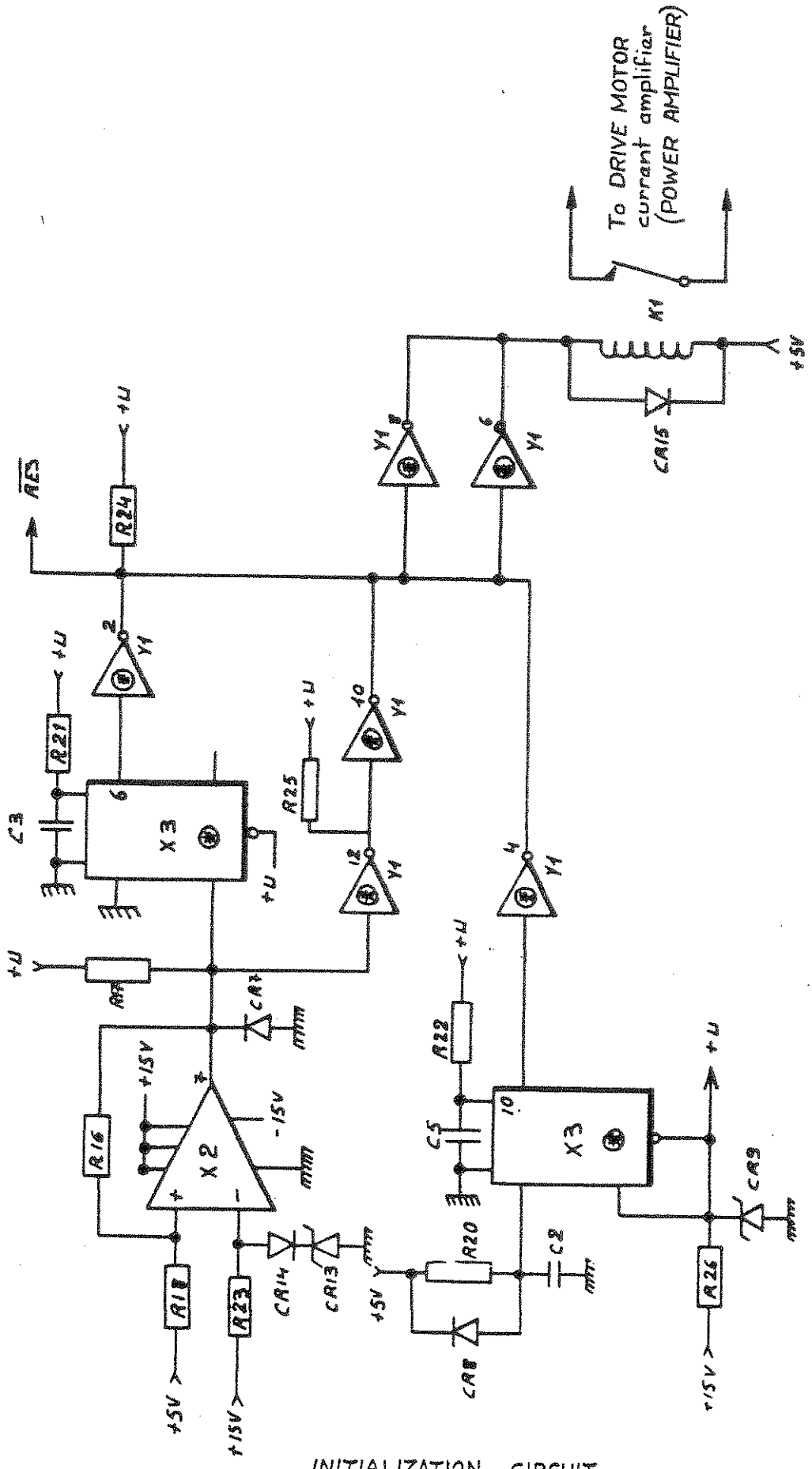
During switching on, the + 5 V power supply is applied and charges capacitor C2 through resistor R20. The leading edge of the capacitor charge signal triggers monostable (X3-10) which generates a positive pulse (see NOTE). The inverter (Y1-4) complements this pulse to supply a pulse, active at level zero, to initialize "$\overline{RES}$".

The voltage "+U" energizing resistor (R24) charging the open-collector inverters (Y1-2) (Y1-10) and (Y1-4), is obtained from the + 15 V via resistor (R26) and is regulated by diode (CR9).

Diode (CR8) is used for quickly discharging (C2) in the event of a break in the power supply voltage.

Parallel-connected inverters (Y1-6) and (Y1-8) control relay (K1) from "$\overline{RES}$". (K1) is normally closed and blocks the DRIVE MOTOR amplifier during the initialization pulse then opens when energized, to enable carriage movement.

NOTE : Monostable (X3-10) signifies : monostable corresponding to output (10) of package (X3). Pulse duration : 30μS typical.



⊛ +U power supply

INITIALIZATION CIRCUIT

1.6.2. Operation during a short break in the power supply voltage

Because the + 15 V power supply voltage remains established longer than the + 5 V, the operational amplifier (X2) receives the + 5 V through resistor (R18) of the positive input and compares it to a reference, obtained by diodes (CR13-CR14) and resistor (R23) from the + 15 V.

When a break in the mains power supply causes the + 5 V voltage to drop below the input reference threshold (4.6 V), the amplifier (X2) provides a high to low level signal which triggers monostable multivibrator (X3-6).

Multivibrator (X3-6) generates a positive pulse (longer than 60 ms), complemented by inverter (Y1-2), to give the initialization pulse "$\overline{\text{RES}}$", active at level zero.

During the transmission of "$\overline{\text{RES}}$", the inverters (Y1-8) and (Y1-6) return relay (K1) to the de-energized state thus blocking the DRIVE MOTOR amplifier. Resistor (R17) energizes the output transistor of the amplifier (X2) while the diode (CR7) clamps the negative peaks of the output signal.

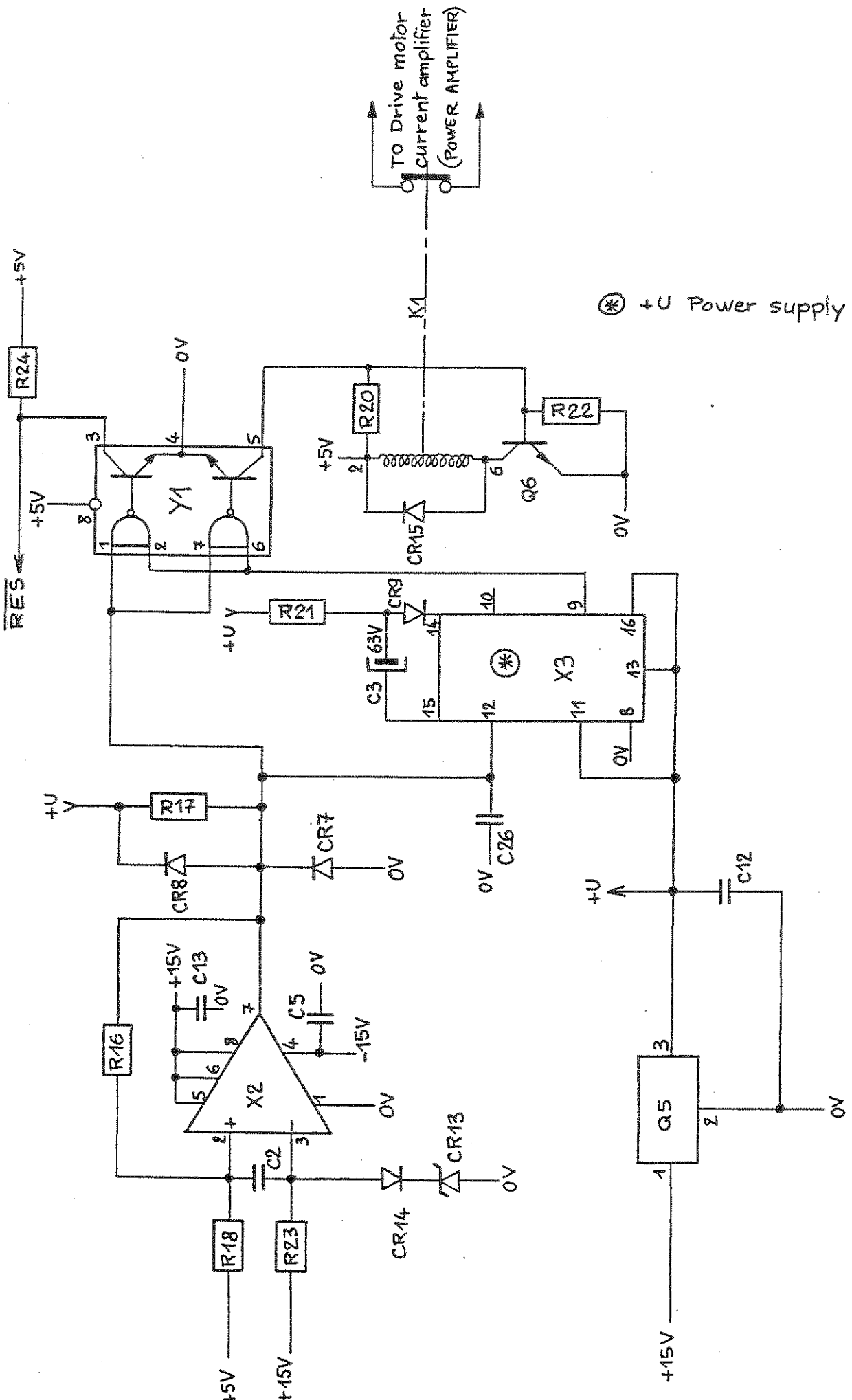
1.6.3. Operation during a drop in power supply voltage

When the power supply voltage drops beyond the rated tolerance, the + 5 V voltage comprises ripple superposed on the DC voltage.

The ripple, shaped by amplifier (X2), triggers multivibrator (X3-6) which generates the "$\overline{\text{RES}}$" signal through the inverter (Y1-2).

The operating details are identical to those described in the preceding paragraph.

If the power supply voltage drop continues beyond the duration of the multivibrator pulse, the "$\overline{\text{RES}}$" signal is supplied by the inverters (Y1-12) loaded by resistor (R25), and (Y1-10).



INITIALIZATION CIRCUIT

1.6.4 Complementary data

INITIALIZATION CIRCUIT
(«ALIMENTATION» board, plate 3-3)

The initialization circuit is used for two purposes :

- Firstly, applying a pulse, active at level zero «$\overline{\text{RES}}$» (Restart), which initializes all the input-output circuits and the microprocessor, in the following cases :

  . switching on of the unit,

  . brief break or drop in power supply voltage beyond tolerance provided for.

- then, inhibiting the DRIVE MOTOR amplifier during the initialization signal.

1.6.4.1 Operation during switching on

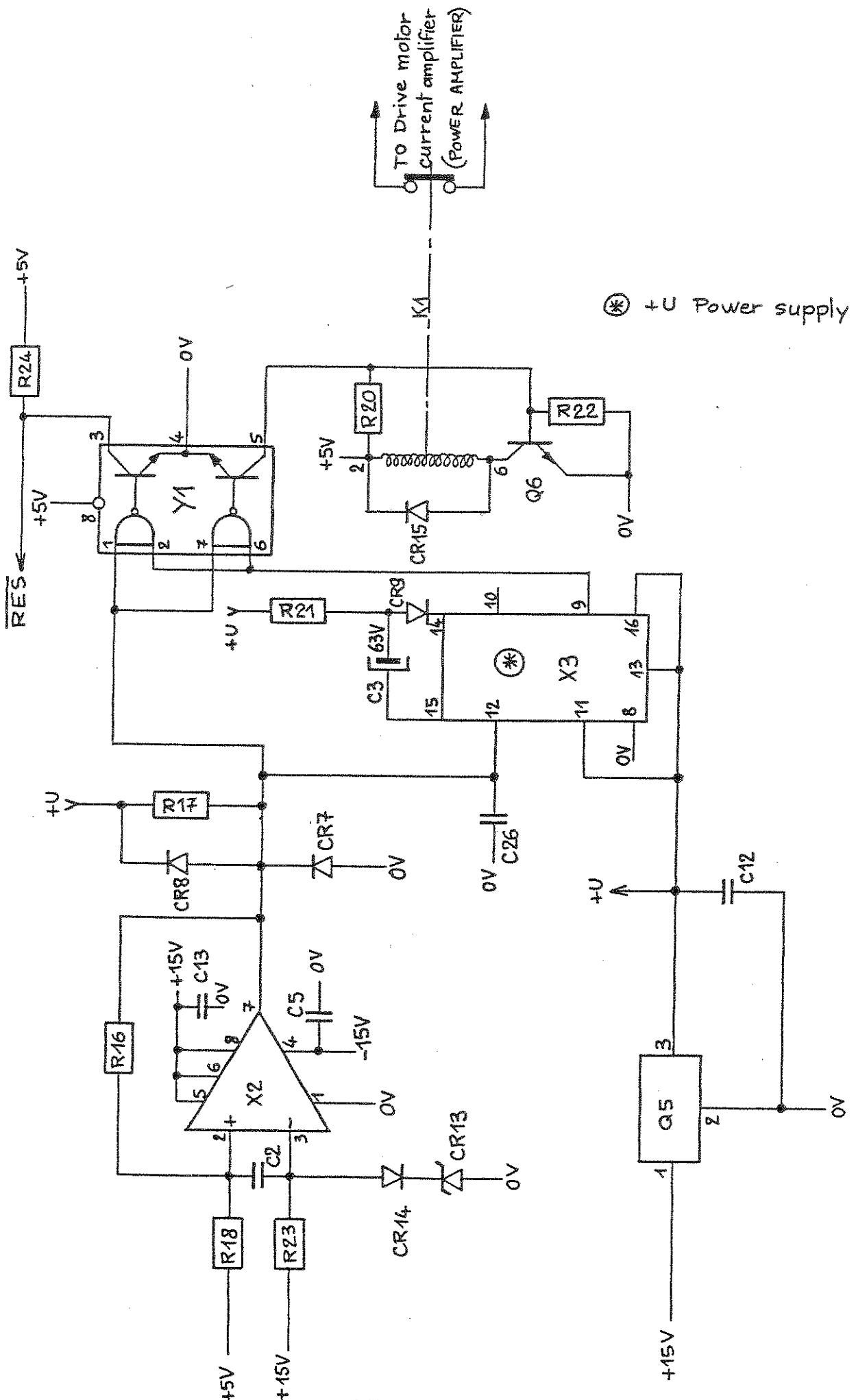
During switching on, the + 15 V power supply is applied before the + 5 V, permitting to supply the monostable (X3) and to provide the reference voltage on (X2) before the + 5 V.

The voltage «+ U» energizing resistors (R17) and (R21) is obtained from the + 15 V through the voltage regulator (Q5).

The comparator (X2-7) generates a high level logic, the positive transition puts (X3-9) to a low level during the time constancy of the monostable determined by the resistor (R21) and the capacitor (C3) (about 150 ms). The inputs (Y1-1) being to «1» and (Y1-2) to «0» the output transistor of (Y1) becomes conducting and generates a pulse, active at level zero «$\overline{\text{RES}}$». After 150 ms (X3-9) changes to a high level thus causing switching to state «1» of «$\overline{\text{RES}}$».

During the transmission of «$\overline{\text{RES}}$», the transistor (Q6) becomes blocked and the relay (K1) which is normally closed blocks the DRIVE MOTOR amplifier. After 150 ms the contact opens and enables carriage movement.

The diodes (CR8 - CR7) clamps the peaks of the output signal.



INITIALIZATION CIRCUIT

1.6.4.2 Operation during a short break or a drop in power supply

Because the + 15 V power supply voltage remains established longer than the + 5 V, the comparator (X2) receives the + 5 V through resistor (R18) of the positive input and compares it to a reference, obtained by diodes (CR13 - CR14) and resistor (R23) from the + 15 V.

When a break in the mains power supply causes the + 5 V voltage to drop below the input reference threshold (4.6 V), the comparator (X2-7) provides a high to low level signal, the inputs (Y1-1) and (Y1-7) switch and the signal «$\overline{\text{RES}}$» changes to a low level. When the power supply becomes normal the comparator (X2-7) generates a low to high edge which triggers monostable (X3). After 150 ms, the signal «$\overline{\text{RES}}$» changes to «1», the transistor (Q6) is saturated and carriage movement is permitted.

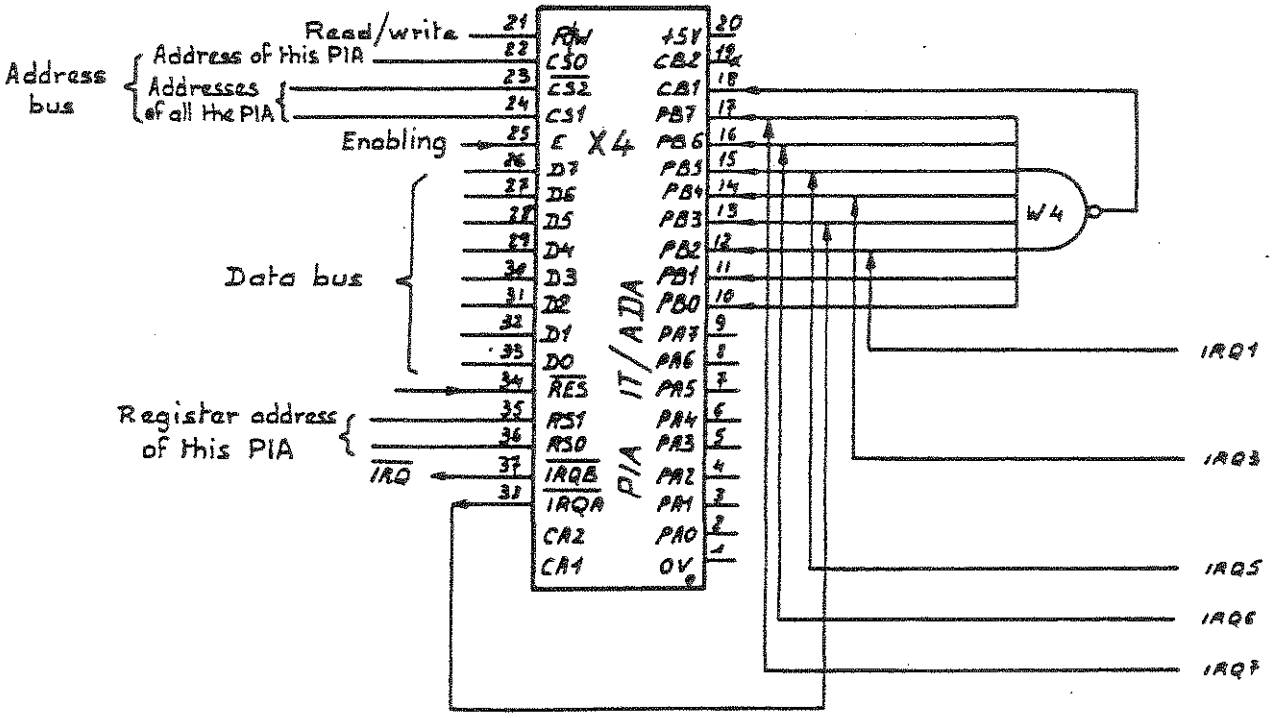
1.7 PROGRAM INTERRUPT INPUT-OUTPUT CIRCUIT

("PIA ERD + IT/ADA" board)

The interrupts (IRQ1 to IRQ7) from the various unit input-output circuits simultaneously excite :

- inputs (PB0 to PB7) of the input-output circuit ("PIA IT/ADA", X4),
- an 8-input "NAND" logic gate (W4).

The output signal of the logic gate is applied to input (CB1) of (X4). Output ($\overline{IRQB}$) of (X4) supplies the "$\overline{IRQ}$" signal applied to the microprocessor on the "PIA CLAVIER + MPU" board.



1.8 PROGRAM AND WORKING MEMORIES

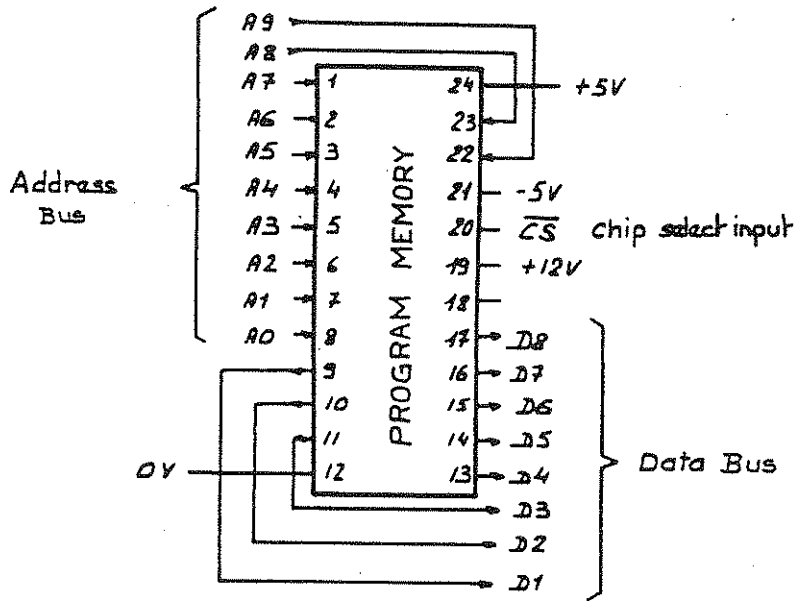
(«RAM - RPROM» board, plate 9-1)

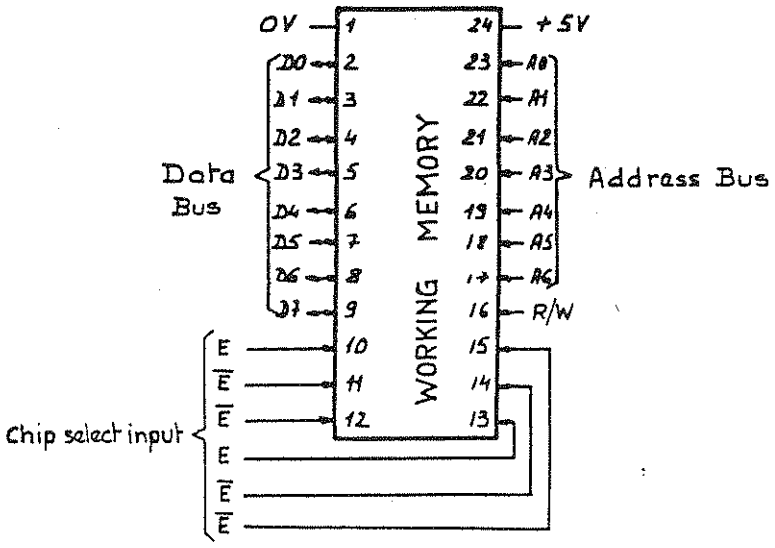
1.8.1 General

The unit uses two types of memories :

- the program memory (RPROM or REPROM)
- the working memory (RAM).

The instructions, contained in the program memory, define the reactions of the unit according to the context and the controls received. The working memories permanently store the status of the unit and record certain data which cannot be processed immediately.





1.8.2 Program-memory (figures 1 and 2)

The outputs (D0 to D7) are connected to the data bus. The addressing signals "A0" to "A9" are adapted to levels 0 and + 5 V by the circuits (Z1 to Z3). The selection of a package is ensured by the input ($\overline{CS}$). A decoder circuit (Z4) makes selections from signals "A10", "A11" and "A12". The program memory consists of 7 packages (Y2, Y3, Y5, Y7 to Y10) mounted in I.C. sockets.

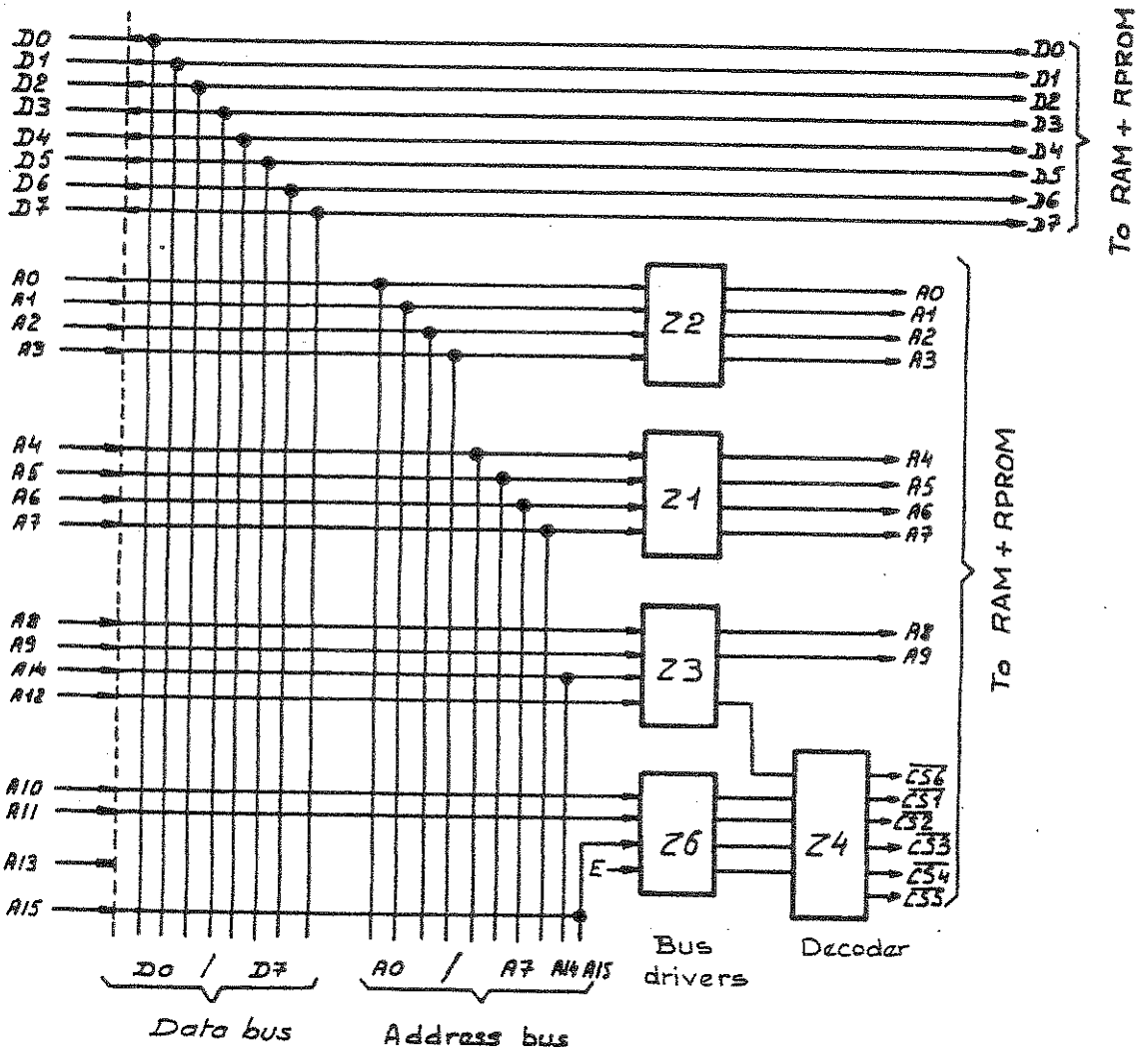


figure 1 Program memory

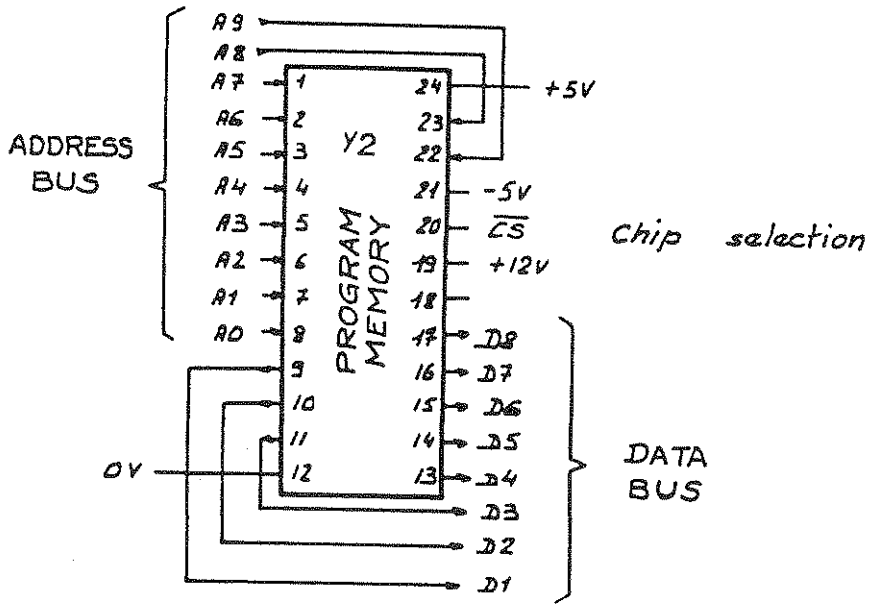


Figure 2. Program memory (R PROM)
7 identical packages Y2, Y3, Y5, Y7/Y10

1.8.3 Working memory (figures 1 and 3)

The inputs or outputs (D0) to (D7) are connected to the data bus. The addressing signals "A0" to "A6" are adapted to levels 0 and + 5 V by the circuits (Z1) and (Z2). The selection of a package is made through inputs (E) and ($\overline{E}$), with "A7", "A8", "A14", "A15" and "E" signals. The working memory consists of two packages (Y12 and Z11).

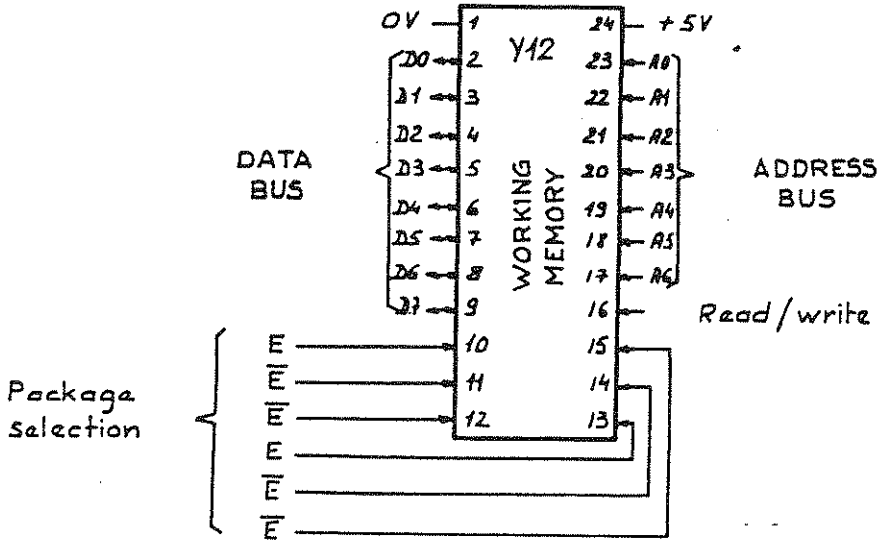


Figure 3 Working memory (RAM)
two identical packages Y12 and Z11

1.8.4 Complementary data

(«RAM + RPROM» board, plate 9-3)

Program memory (Figure 1)

The program memory consists of 4 packages (Z01, Z02, Z03, Z04) mounted in I.C. sockets.

The selection of a package is provided by inputs «E*» and «ADM1*» to «ADM5*». These inputs are driven by a decoder - demultiplexer circuit from signals «$\overline{AD11}$», «$\overline{AD12}$», «$\overline{AD13}$» and «$\overline{SELCM}$». The signal «$\overline{SELCM}$» is generated from signals «AD14», «AD15» and «R/W*».

Logicial 8 K : strap S in position $\lessdot$ 8 K.

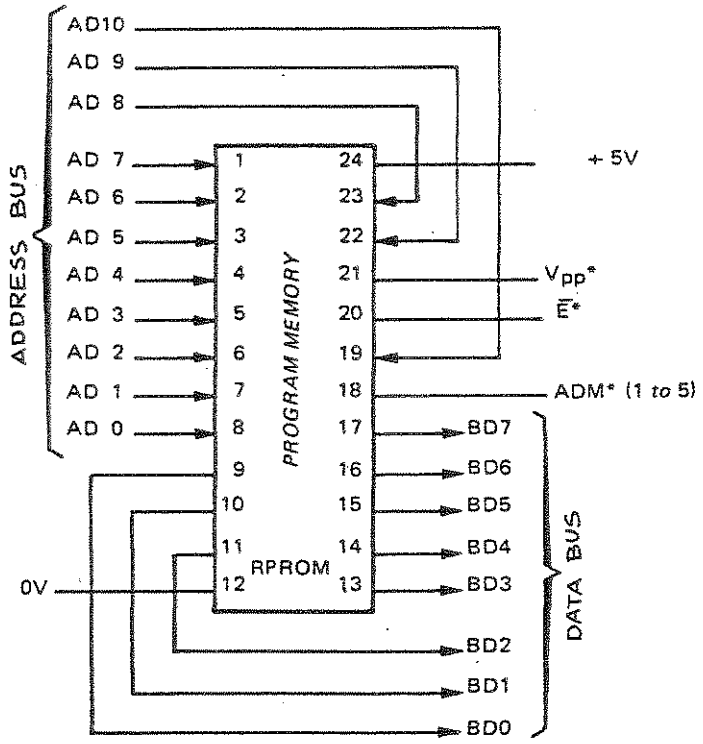


FIGURE 2 - PROGRAM MEMORY (RPROM)
(4 identical packages Z01, Z02, Z03, Z04)

Addressing signals «AD0» to «AD10» proceeding from «A0» to «A10» and outputs «BD0» to «BD7» are respectively adapted to the address bus and to the data bus of the microprocessor through adaptors circuits (Z06, Z07, Z08, Z13, Z16).

Working memory (Figure 2)

The working memory consists of 2 packages (Z14 and Z15).

The inputs or outputs «D0» to «D7» are connected to data bus.

Signals «AD0» to «AD9» and «D0» to «D7» are respectively adapted to the data bus and to the address bus through adaptors circuits (Z06, Z07, Z13, Z16).

The selection of a package is made through inputs «$\overline{CE}$» and «R/W*», with «A14», «A15», «E» and «R/W*» signals.

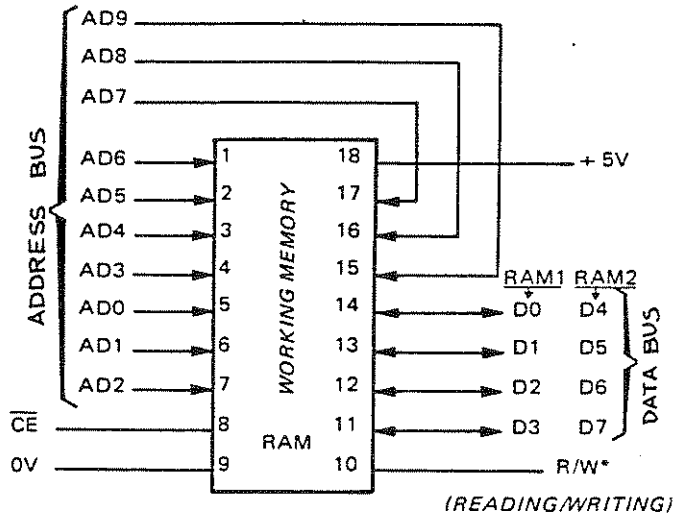
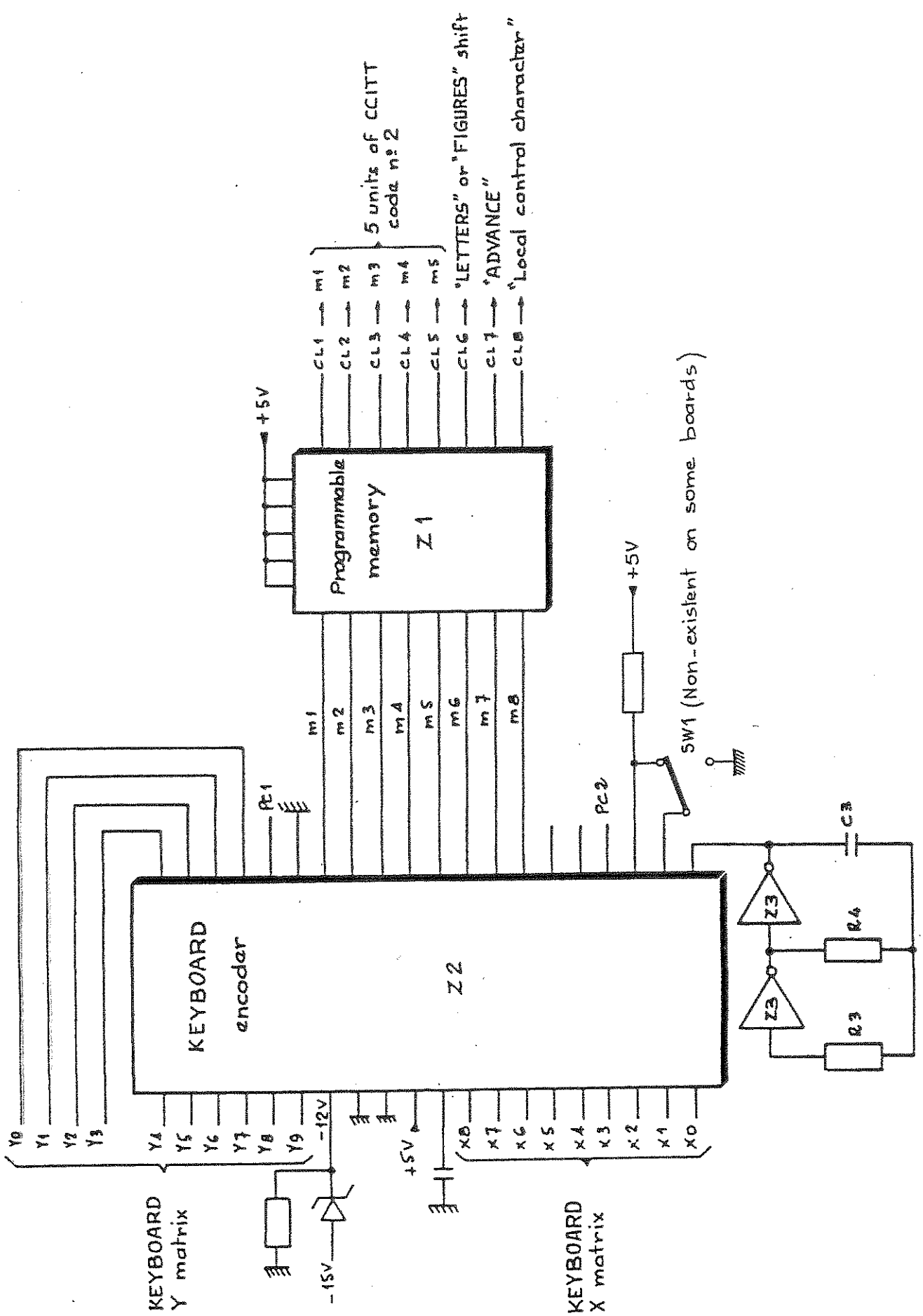


FIGURE 2 - WORKING MEMORY (RAM)
(2 identical packages Z14 and Z15)



"CLAVIER" board

2 – KEYBOARD
(«CLAVIER» board)

2.1 GENERAL

The keyboard is of the extended type. The 9 inputs (X0 to X8) of the KEYBOARD matrix, associated with 10 outputs (Y0 to Y9) of the same matrix, allow 90 combinations to be generated.

The electronic part of the KEYBOARD mainly consists of two "MOS" circuits :

- one KEYBOARD encoder (Z2),
- one "ROM" programmable memory (Z1).

When a key is depressed, the encoder of the KEYBOARD (Z2) supplies :

- character presence signals "PC1" and "PC2",
- the addressing of the memory corresponding to the selected character code (m1 to m8).

The KEYBOARD encoder compares the output signals from two counters : (X0 to X8) from the first one, (Y0 to Y9) from the second one. The depressing of a key generates continuity between an X and a Y. The similarity between the signals (Y0 to Y9) and (X0 to X8) causes the transmission of "PC1". Signal "PC2" remains present as long as the KEYBOARD key is held down.

An external clock provided by two inverters (Z3), two resistors (R3 and R4) and a capacitor (C3), supplies a signal to the KEYBOARD encoder with a frequency of approximately 10 kHz.

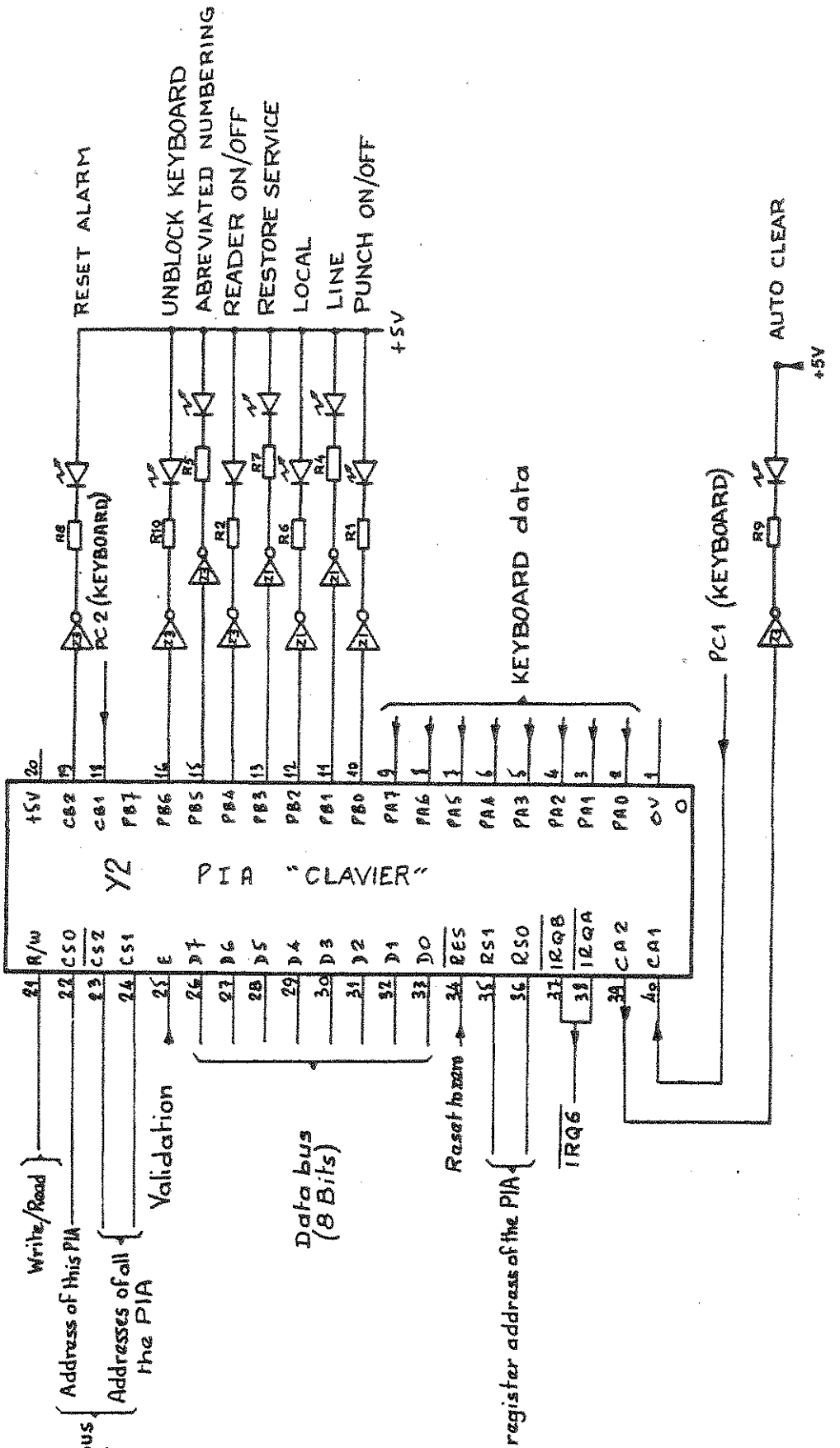
The programmable memory (Z1) code-converts the following signals for the "PIA CLAVIER + MPU" board :

- the 5-units of CCITT code No. 2 ("CL1" to "CL5"),
- the "LETTERS" or "FIGURES" shift ("CL6"),
- "character causing advance" ("CL7"),
- "local control character" ("CL8").

The generation of the "LETTERS" or "FIGURES" character is automatic.

When a key is depressed, signal "PC1" induces the triggering of a count in MPU (X5) of "PIA CLAVIER + MPU" board. After 1 second, if the signal "PC2" corresponding to the releasing of the key has not cancelled the count, the character is transmitted repeatedly.

The switch (SW1) allows selection of fast typing on two or several keys. According to its position, (SW1) applies a logic level «0» or «1» to terminal (2) of the KEYBOARD encoder (Z2).



KEYBOARD input_output circuit

2.2 KEYBOARD INPUT-OUTPUT CIRCUIT

("PIA CLAVIER + MPU" board)

The input-output circuit (Y2) is addressed by signals (CS0, CS1 and $\overline{CS2}$). One of the registers of the input-output circuit (Y2) is selected by signals (RS0, RS1).

The character presence signal "PC1" supplied by the KEYBOARD triggers the interrupt request of part A ($\overline{IRQA}$) towards the PIA IT/ADA input-output circuit (X4) of the "PIA ERD + IT/ADA" board. The signals "CL1" to "CL8" supplied by the KEYBOARD appear at inputs (PA0 to PA7) of the KEYBOARD input-output circuit (Y2). The outputs (PB0 to PB6) control the amplifiers (Z1 and Z3) of the OPERATIONAL CONSOLE light-emitting diodes corresponding to the selection functions.

The character presence signal "PC2" supplied by the KEYBOARD triggers the input-output circuit (Y2). "CB1" controls the interrupt request of part B ($\overline{IRQB}$) to the input-output circuit PIA IT/ADA (X4) of the "PIA ERD + IT/ADA" board.

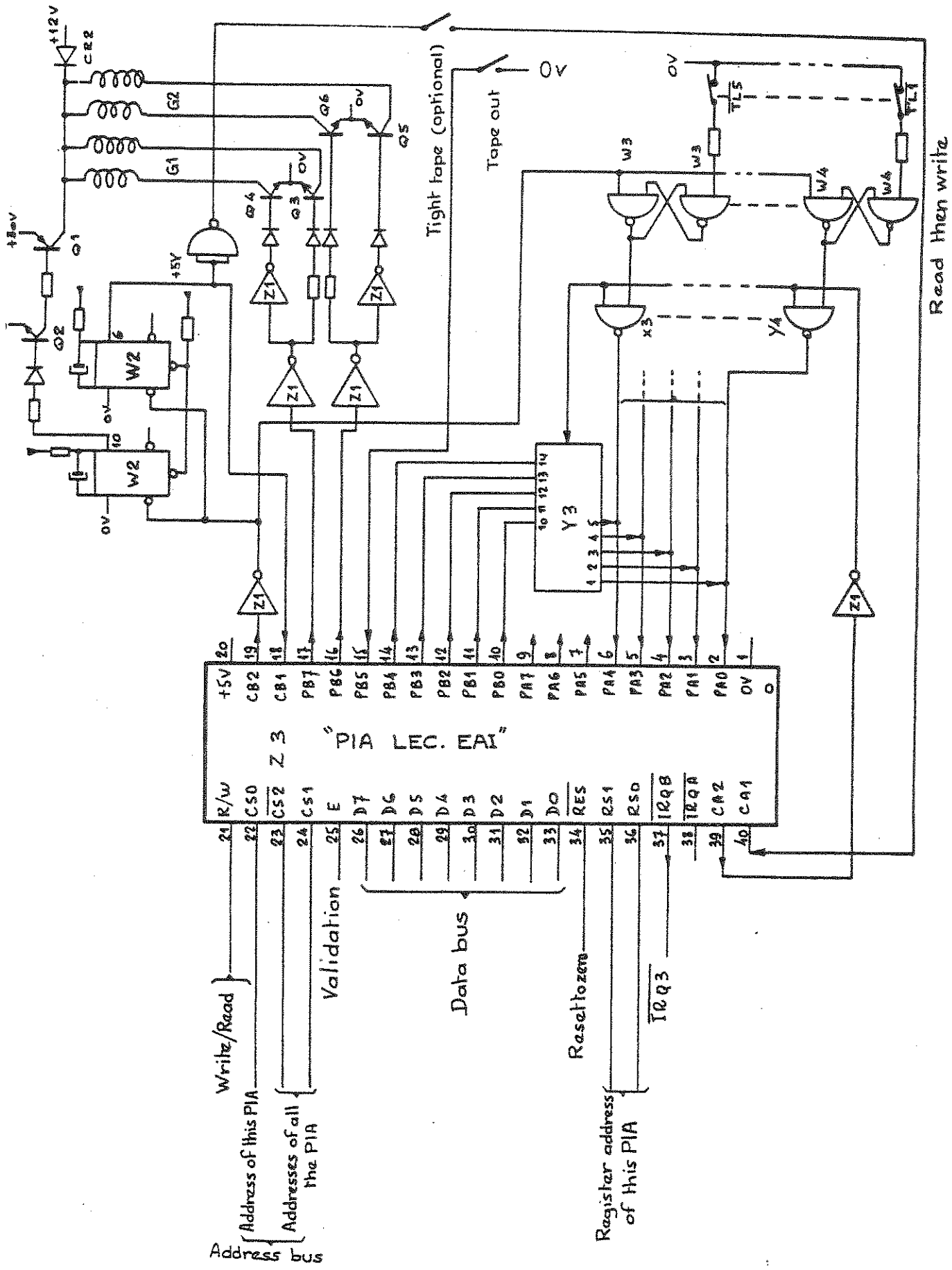
Resetting is obtained by the application of the "restart" signal on ($\overline{RES}$).

2.3 OPERATIONAL CONSOLE

(OPERATIONAL CONSOLE, "CLAVIER", "PIA CLAVIER + MPU" boards)

In the same way as the KEYBOARD keys, the control keys of the OPERATIONAL CONSOLE select the KEYBOARD encoder. The 7 inputs (X1 to X7) associated with the 2 outputs (Y8 and Y9) generate local controls.

The OPERATIONAL CONSOLE controls are displayed by light-emitting diodes. Resistors (R1 to R10) are connected in series with the light-emitting diodes in order to limit the current.



TAPE READER and ANSWER-BACK UNIT

input-output circuit

3 – PUNCHED TAPE READING (TAPE READER, «PIA LECTEUR + AMPLI» board)

3.1 TAPE READER

3.1.1 Characteristics of TAPE READER

- Maximum reading speed : 15 c/s
- Reading mode : character by character
- Character visibility during reading
- Nominal thickness of tape (DIN 6720) : 0.1 mm
- Maximum thickness of tape with sticker : 0.3 mm.

3.1.2. Characteristics of tape feed system

- Motor power supply voltage : 30 V
- Sustaining voltage : 12 V.

3.2 TAPE READER AND ANSWER-BACK UNIT INPUT-OUTPUT CIRCUIT ("PIA LECTEUR + AMPLI" board)

3.2.1 General

The "PIA LEC.EAI" input-output circuit (Z3) supplies certain common signals to the TAPE READER and the ANSWER-BACK UNIT and receives signals from them.

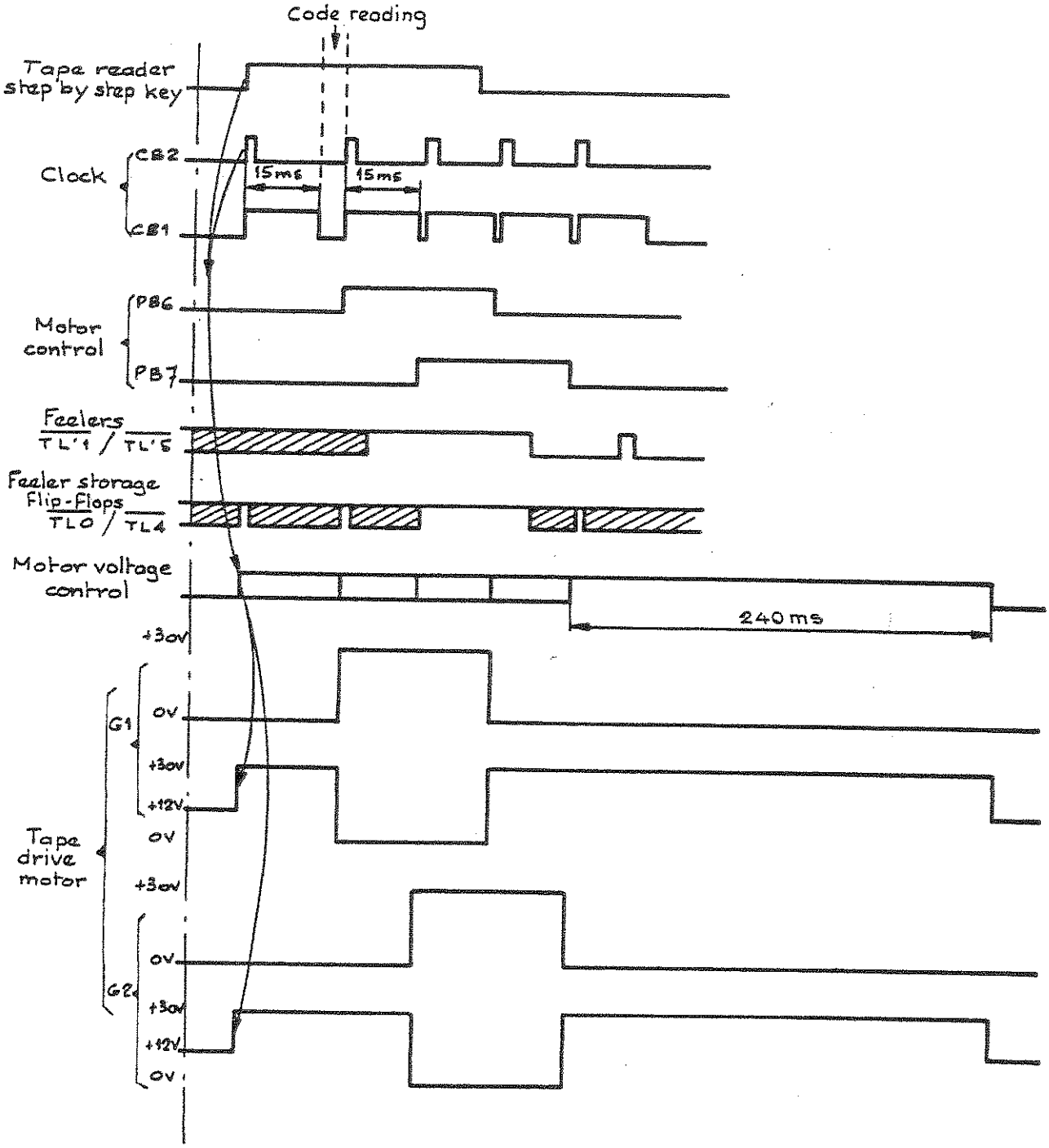
1) The tape reader consists of :

   - a reader tape feed function ensured by a four-phase stepper motor making 48 steps per revolution. The motor controls the movement of the sprocket wheel via a 1:3 ratio demultiplication to provide 4 motor steps per tape transport step,
   - a function acknowledging character punched on the tape ; reading is made by feelers.

2) The answer-back code is stored in a programmable memory (Y3).

3.2.2 Operation

The phases of the tape drive motor are supplied through transistor (Q1) at a voltage of + 30 V during the operation of the TAPE READER. When the TAPE READER is stationary, the diode (CR2) switches the voltage to + 12 V in order to maintain torque on the motor.



TAPE READER Signal timing diagram

The signal "CB2" from the "PIA LEC. EAI" input-output circuit (Z3) triggers :

- a monostable (W2-6)(pulse duration 15 ms typ.) designed to inform the microprocessor that it can, if necessary order another motor step,

- another monostable (W2-10)(pulse duration 240 ms typ.) controlling the motor power supply 12 V/30 V voltage switching circuit.

When the TAPE READER is stationary, the feelers detect a hole in the tape (corresponding to a codification "1" of CCITT code No. 2) and cause a status "0" to appear at the input of the flip-flops (X3, W3, W4) which store the status of the feelers "$\overline{TL0}$" to "$\overline{TL4}$".

The character read is acknowledged by the control logic just before the first transition of the motor phases.

The storage flip-flops are reset to zero by the next "CB2" pulse.

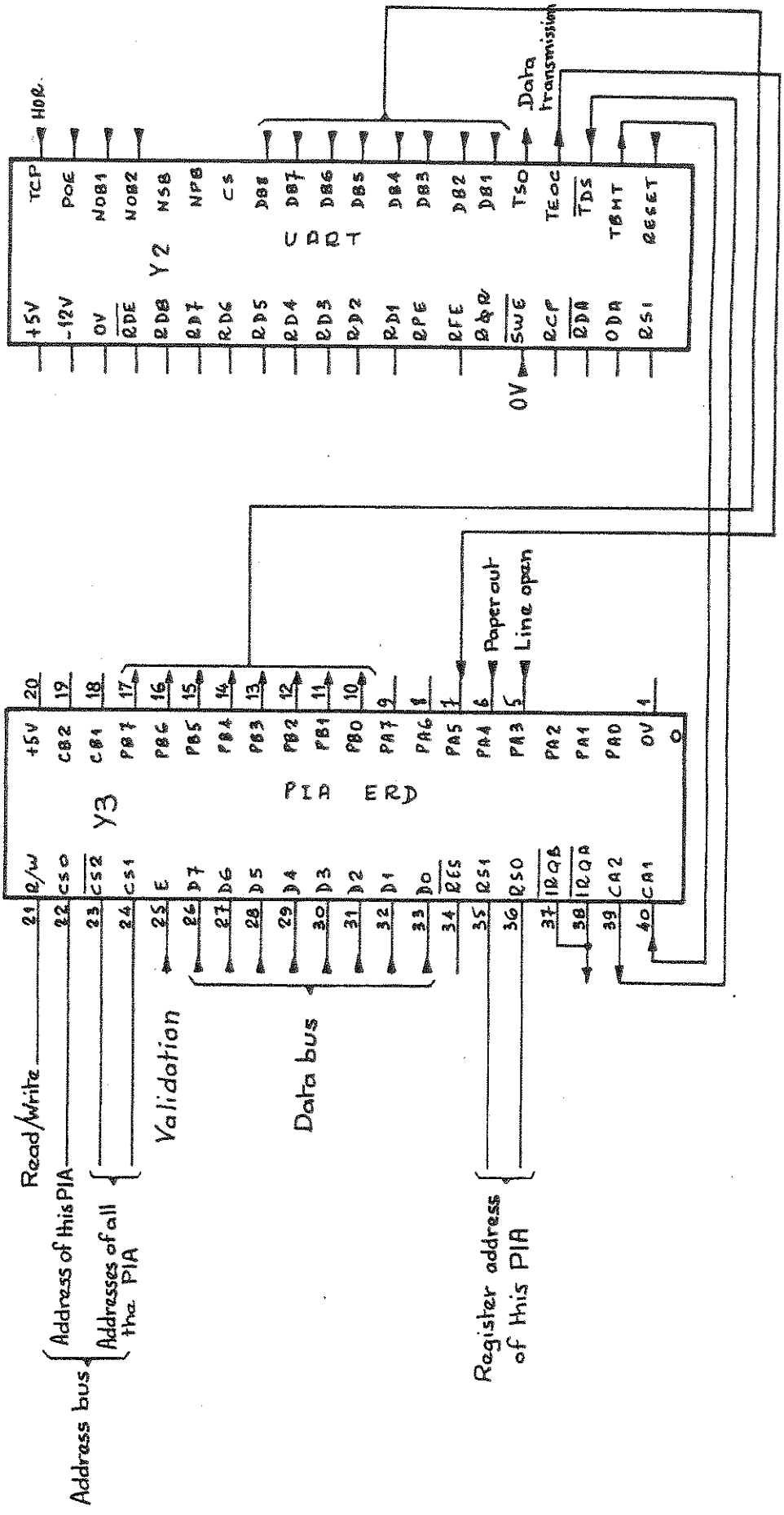
Signal "CA2" validates :

- either the TAPE READER ("CA2" = 0),

- or the answer-back code memory ("CA2" = 1).

A "tape out" wire is connected at (PB5) of the input-output circuit (Z3). A logic state indicated by a feeler denotes that a tape is present in the TAPE READER. The two wires leading to the "tight tape" contact(option), are connected to the "PIA LECTEUR + AMPLI" board. The contact applies the signal from monostable (W2-6) to the input (CA1), thus interrupting the tape transport by the program.

The 5-units from the answer-back code memory are "OR WIRED" with the 5-units of the TAPE READER. The memory circuit (Y3) is addressed by the input-output circuit (Z3) and supplies it with the 20 characters of the answer-back code.



Transmission input-output circuit

4 – TRANSMISSION - RECEPTION
(«PIA ERD + IT/ADA» and «ADAPTATION» boards)

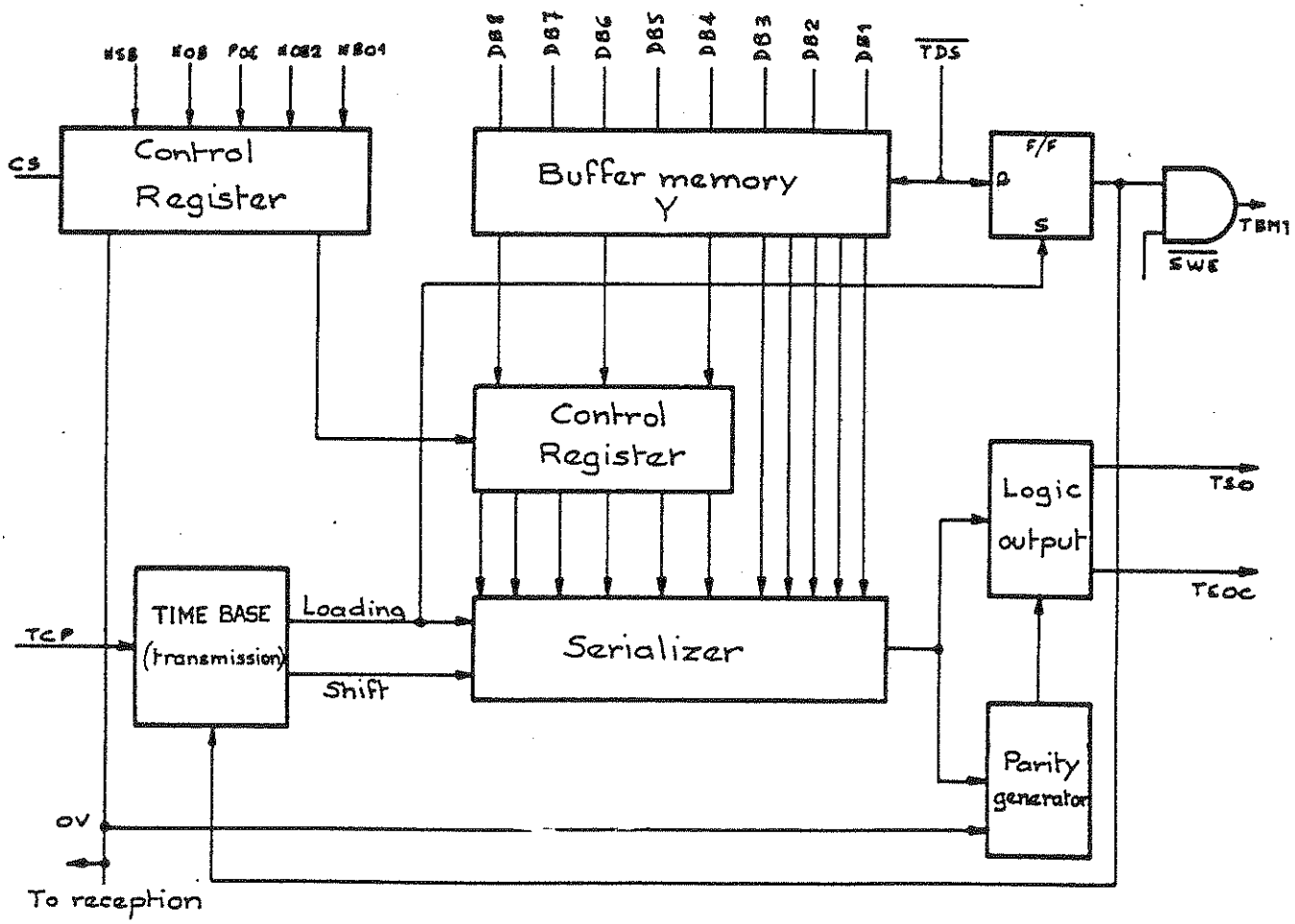
4.1 GENERAL

The "transmission and reception" circuit consists of : a "PIA ERD" input-output circuit (Y3), an "UART" Universal Asynchronous Receiver-Transmitter circuit (Y2), both located on the "PIA ERD + IT/ADA" board, and the components required to adapt the unit to the transmission path.

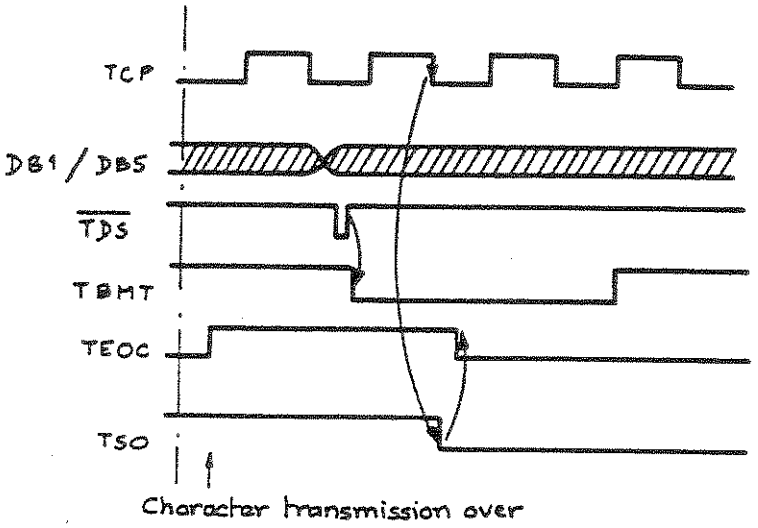
4.2 TRANSMISSION INPUT-OUTPUT CIRCUIT

("PIA ERD + IT/ADA" board)

Part of the "UART" circuit (Y2) generates the transmission function. The input ($\overline{SWE}$), connected to the logic 0 V, selects the output (TBMT) at level TTL. The inputs (POE, NOB1 and NOB2) of the control register select the code used and the parity. The clock signal "HOR" , from the "PIA CLAVIER + MPU" board, controls the transmission time base in (Y2), through input (TCP). The (Reset) input uses a logic level "1" to clear all the registers and counters of (Y2).



The 8-units "PB0" to "PB7" of the character to be transmitted, from input-output circuit "PIA ERD" (Y3), appear at inputs (DB1 to DB8) of the UART circuit (Y2). A level 0 pulse at input ($\overline{TDS}$), enables data input into the buffer memory. The "start" signal is generated on the first trailing edge of the "TCP" clock signal after "$\overline{TDS}$" has been returned to "1". A leading edge of the "TEOC" signal indicates that the transmission of the character and the "stop" signal is over ; this "1" level is held until the trailing edge of the next "start" signal occurs. The "TBMT" signal indicates that the preceding character of the buffer memory has been transferred into the serializer and that another character can be taken into account. The character is transmitted by the output (TSO) of (Y2).

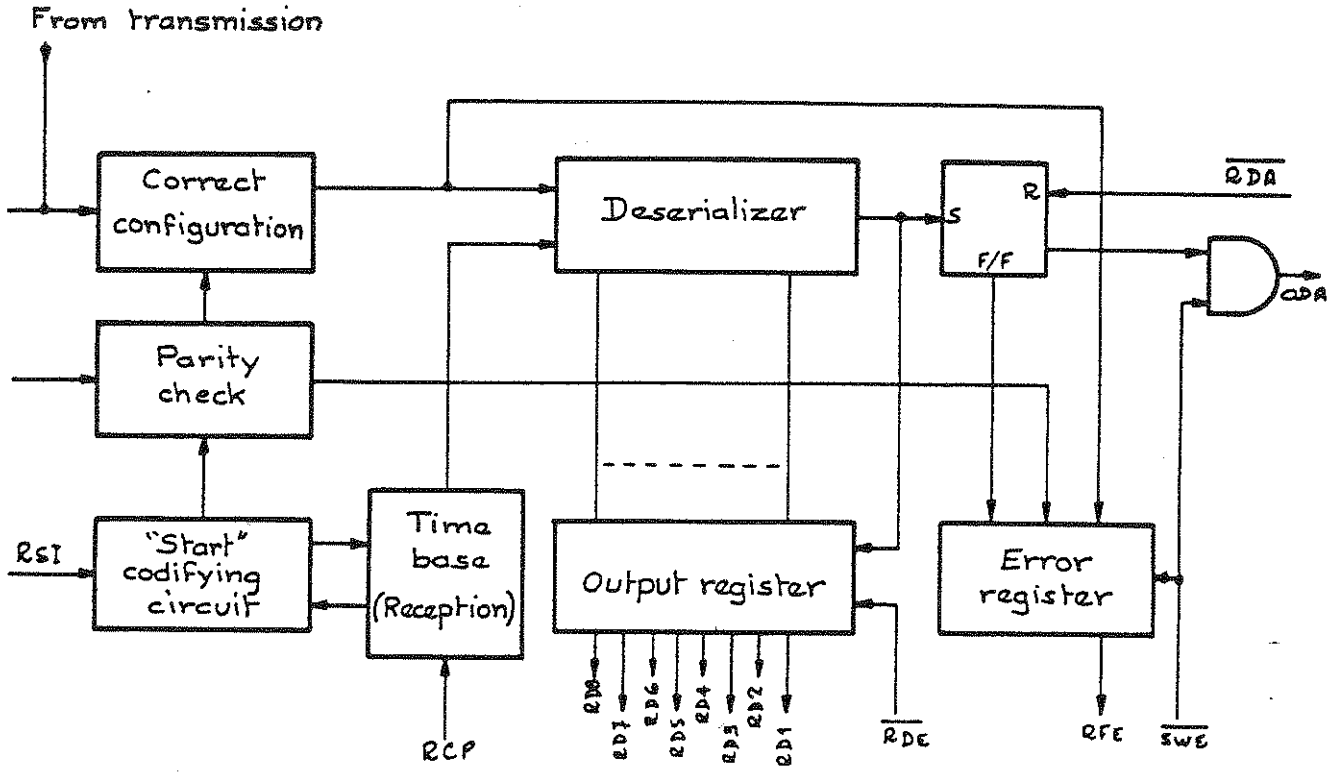


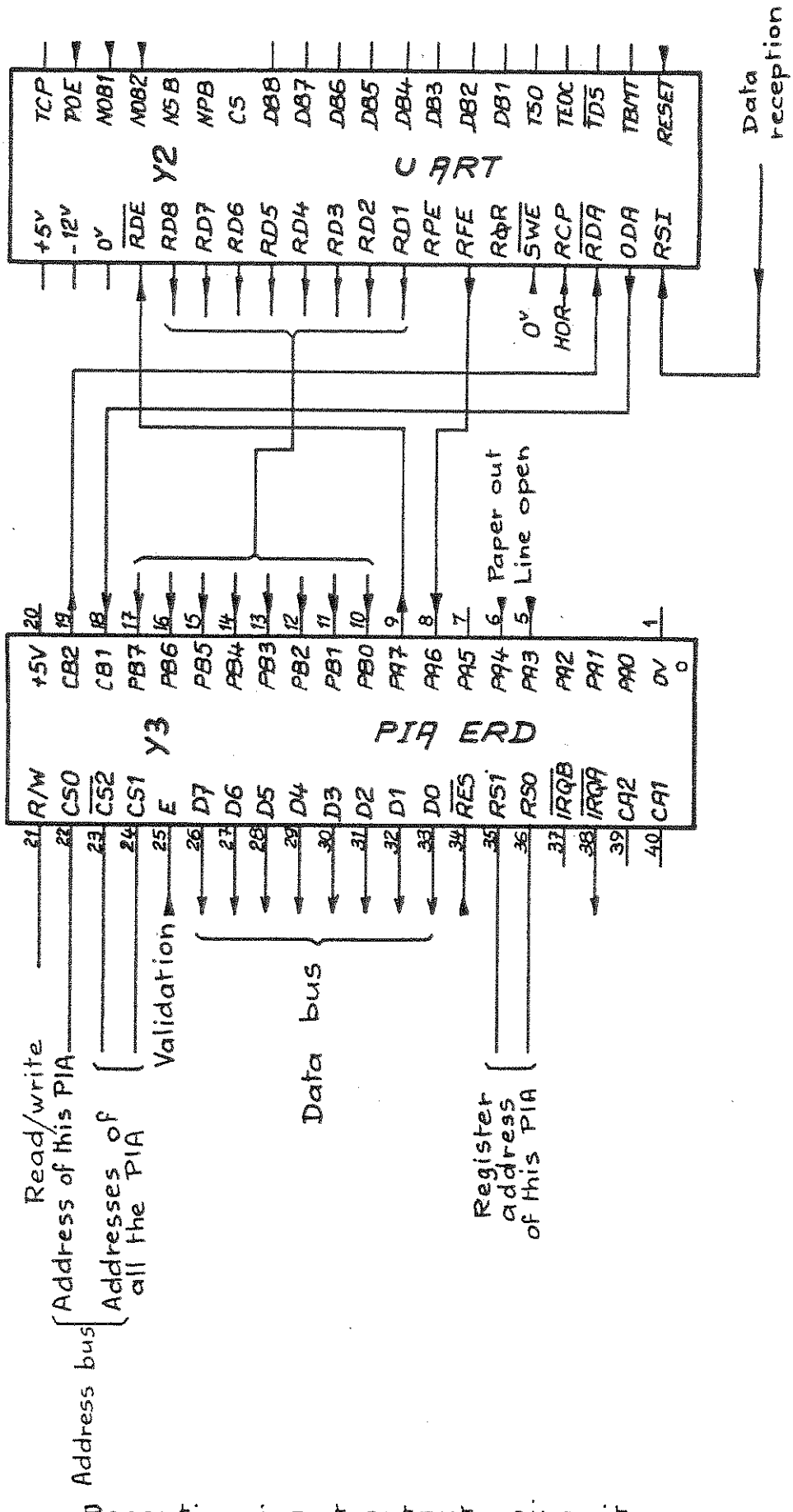
Timing diagram of transmission function

4.3 RECEPTION INPUT-OUTPUT CIRCUIT

("PIA ERD + IT/ADA" board)

One part of the UART circuit (Y2) generates the reception function. The inputs ($\overline{SWE}$ and $\overline{RDE}$), connected to logic 0 V, select the "ODA" output at TTL level. The clock signal "HOR", coming from the "PIA CLAVIER + MPU" board, controls the reception time base in (Y2) through the input (RCP).

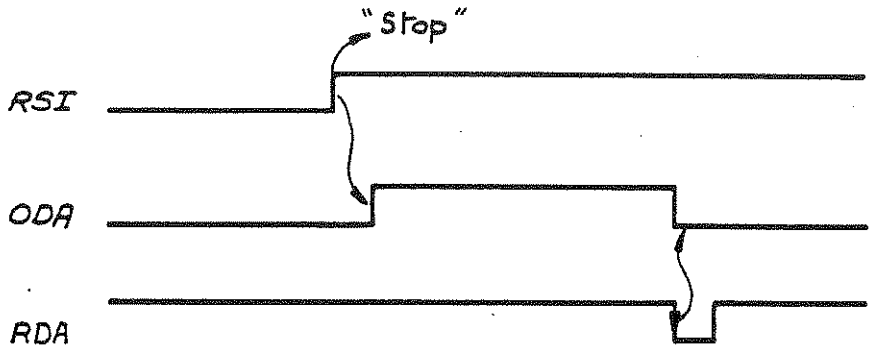




Reception input-output circuit

The character is received at input (RSI). A logic level "1" on the output (ODA) indicates that the complete character has been received and transferred into the output register. The data (RD1 to RD5) is then presented at the output of the UART circuit (Y2) at the last significant unit of the character. The unused outputs (RD6 to RD8) remain constantly at zero. The output (ODA) is reset to zero by the trailing edge of a pulse which appears at input ($\overline{RDA}$). The output (RFE) changes to "1" in the event of incorrect character constitution ("start", units, "stop").

The detection of "paper out" and "line open" inform the microprocessor that it must produce the corresponding interrupts.



Timing diagram of reception function

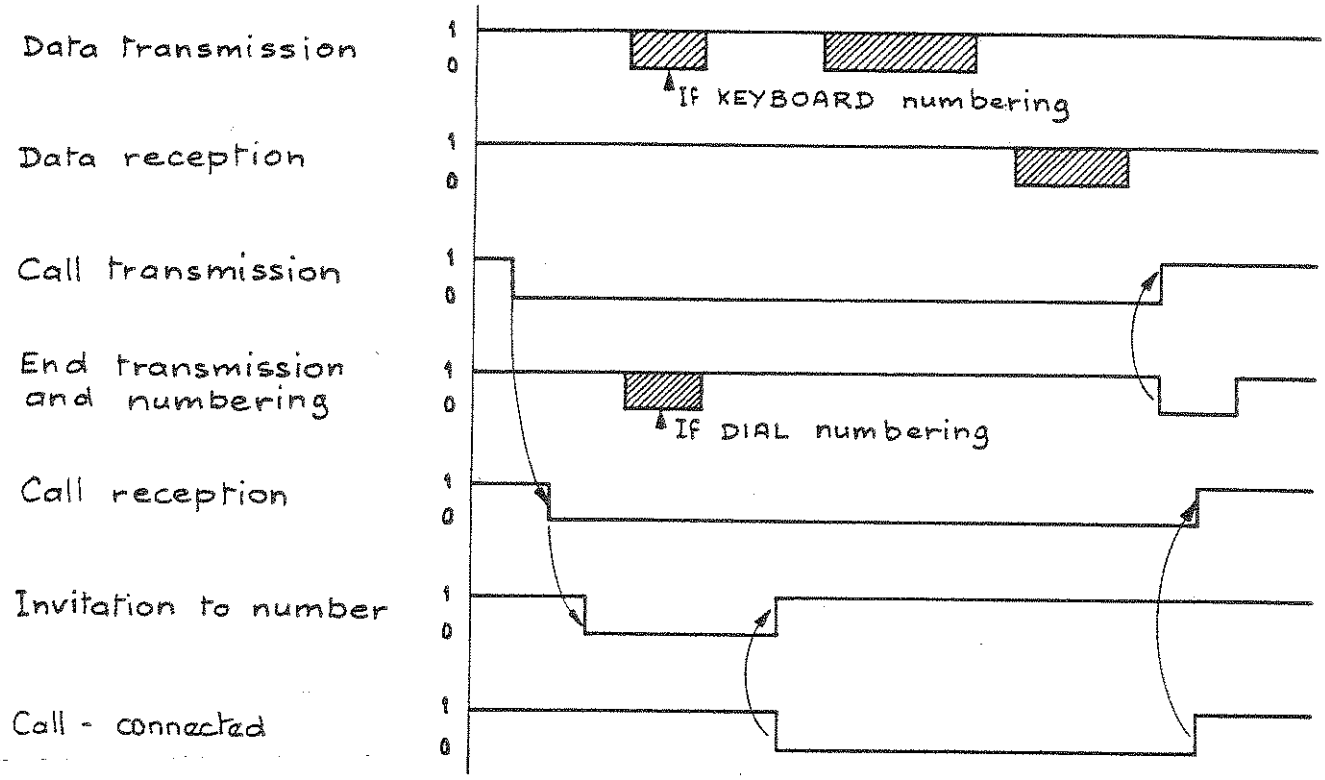


Diagram of data transferred during call transmission

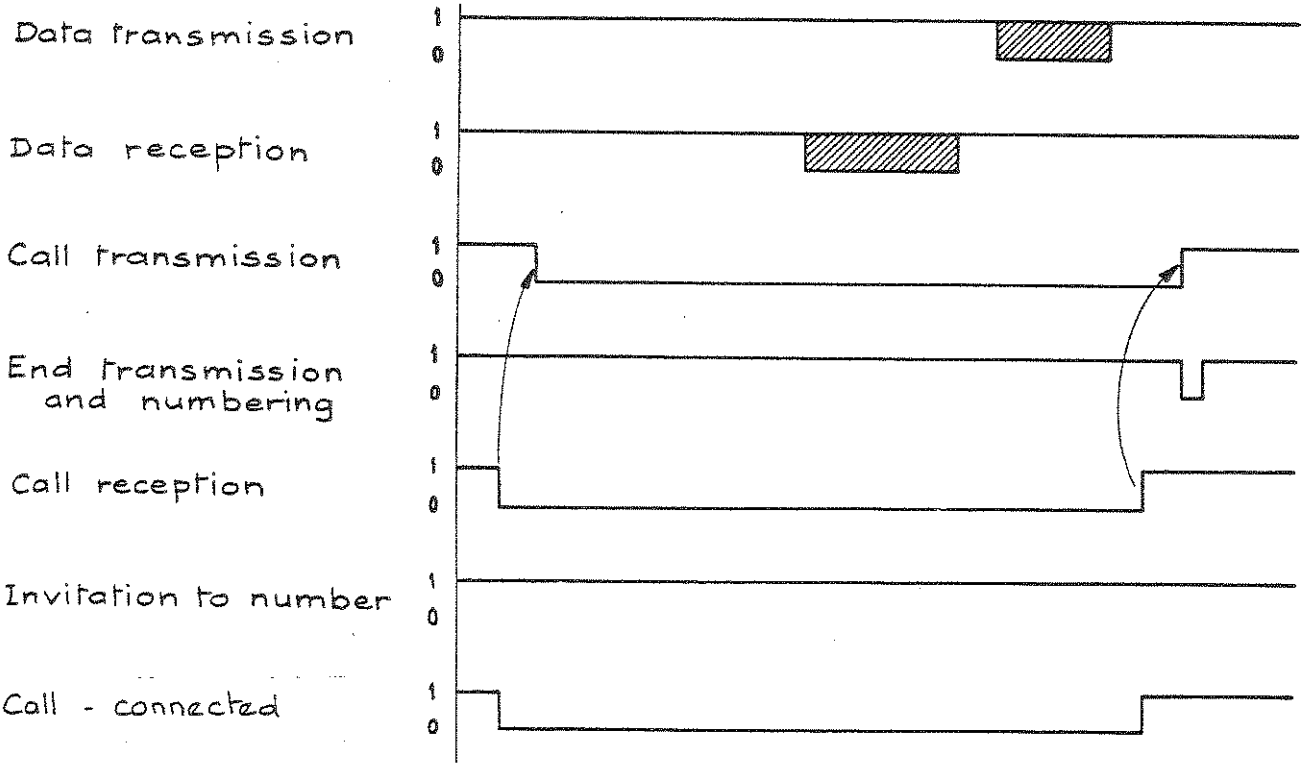


Diagram of data transferred during call reception

4.4 MANAGEMENT OF TRANSMISSION PATH SUPERVISION DATA

("PIA ERD + IT/ADA" board)

Transmission path supervision is obtained by the ADAPTATION board of the unit. The real time clock consisting of two monostables (Y1-7) and (Y1-9) (see NOTE) permanently provides the various timing pulses required.

The circuit supervising the transmission path informs the microprocessor, through the "PIA IT/ADA" input-output circuit (X4), which answers it according to the following preestablished timing sequence :

1) Calling subscriber

- Call transmission : the output (PA7) of PIA changes to level "0" and stays there until the "end transmission" occurs.
- Call reception (call acknowledgement) : if the call has been received, the output (PA5) of PIA receives a logic level "0" which remains present until the "call-connected" disappears.
- Invitation to number : the input (PA4) of PIA receives a logic level "0" which changes to "1" when the "call-connected" appears.
- Numbering : if the numbering is made from the KEYBOARD, it is transmitted to the "data transmission" output (TS0) of the UART circuit (Y2). If a DIAL is used for numbering, the number is transmitted to the PIA output (PA6).
- Call - connected : when the call has been put through, the output (PA3) receives a level "0".
- End transmission : the output (PA6) of PIA changes to "0" at the end of the call thus bringing the "call transmission" signal to level "1".
- The end of the call is confirmed by a logic "1" which appears at the "call reception" input (PA5) and by "call-connected" at (PA3).

2) Called subscriber

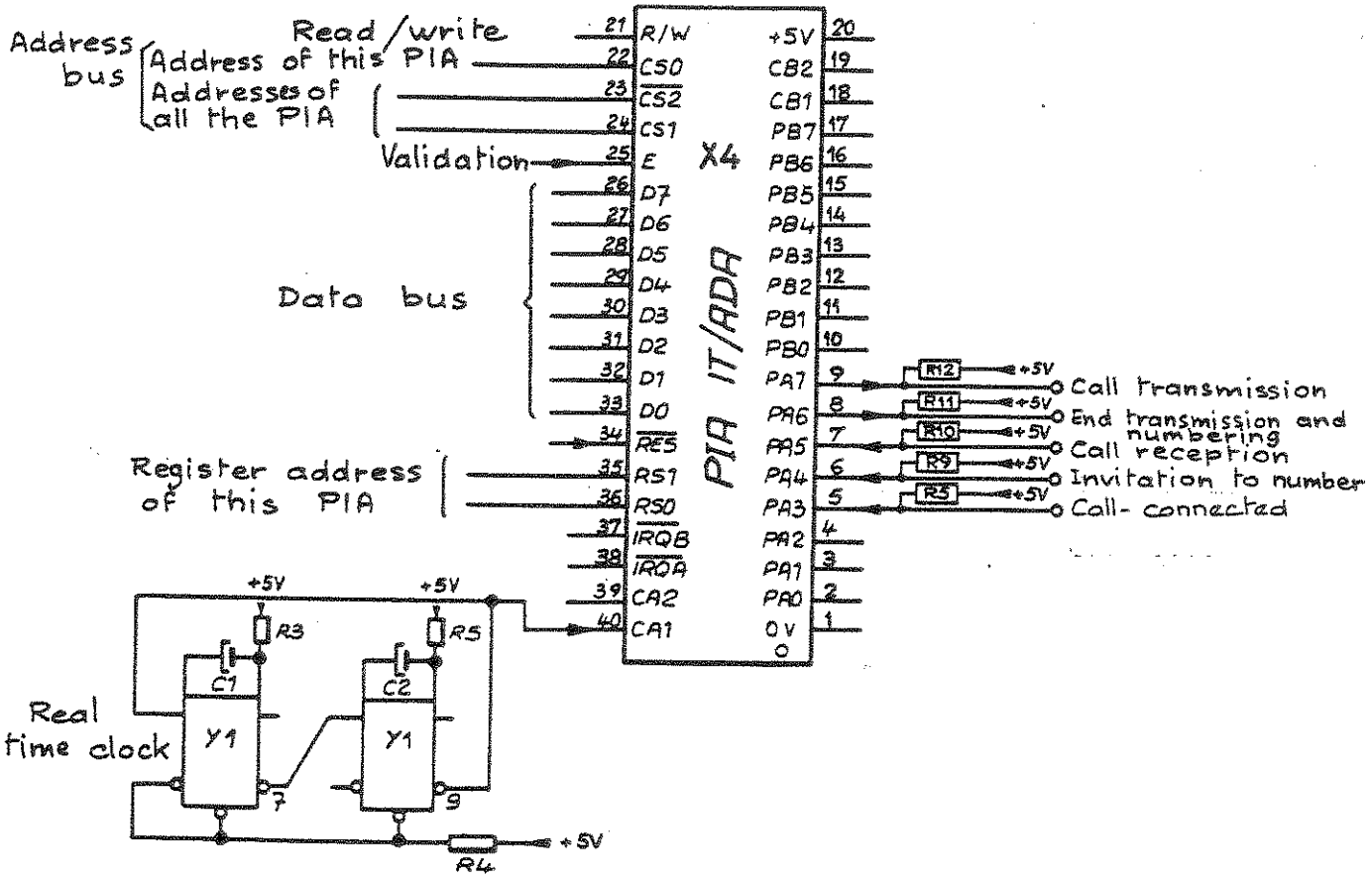
- Call reception and call-connected : the inputs (PA3) and (PA5) receive a level "0" which is held throughout the call.
- Call transmission : the output (PA7) changes to level "0" to confirm call reception and is held there until the end of call information is received.
- End of call returning "call-connected" "(PA3) and "call reception" (PA5) to level "1".

NOTE : Monostable (Y1-7) signifies : monostable corresponding to ouput (7) of package (Y1).

(Y1-9) pulse duration : 1.8 ms typical.

(Y1-7) pulse duration : adjusted through R6 ("PIA ERD + IT.ADA") in such way that t(Y1-7) + t(Y1-9) = 20 ms.

- End transmission : the end of the call is detected by a change of state of "call reception". "PIA" transmits a level "0" to (PA6) which resets call transmission (PA7) to "1" thus confirming a break in the call by switching the correspondent's "call reception" and "call-connected".



4.5 AUXILIARY DEVICES, ALARMS

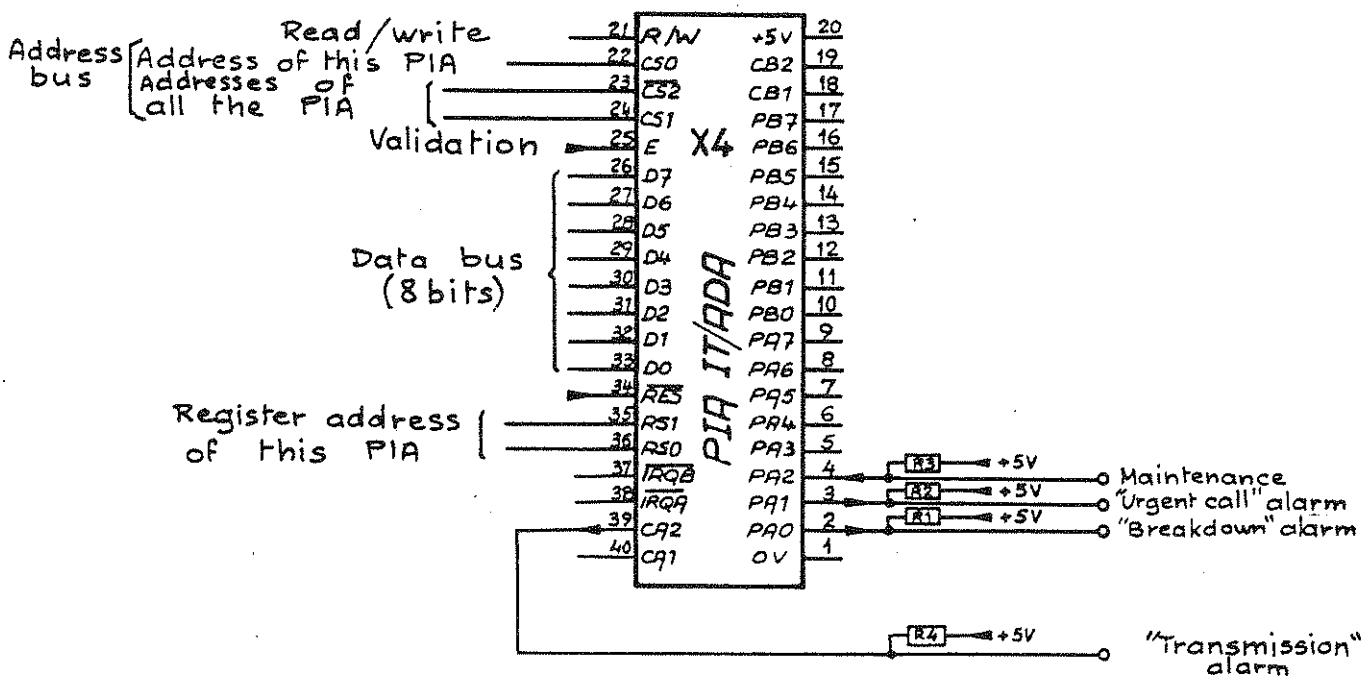
("PIA ERD + IT/ADA" and "ADAPTATION" boards)

The "Maintenance" signal coming from some types of "ADAPTATION" boards applies a logic "0" to the input (PA2) of the "PIA IT/ADA" input-ouput circuit (X4) in certain configurations of the unit on-line. The switching of this signal to the high level prevents the use of the unit in the "LOCAL" mode.

When a received call is accompanied by an audible alarm control ("FIGURES" J), the "urgent call alarm" signal from output (PA1) of PIA changes to level "0".

The "breakdown alarm" signal at output (PA0) of PIA, repeats the OPERATIONAL CONSOLE alarms by changing to zero.

The "transmission alarm" signal, at output (CA2) of PIA changes to "0" for all incoming or outgoing transmissions in synchronization with the "call reception" signal.



4.6 TRANSMISSION PATH ADAPTATION CIRCUITS

("ADAPTATION" board)

See the TECHNICAL DOCUMENT specific to ADAPTATION.

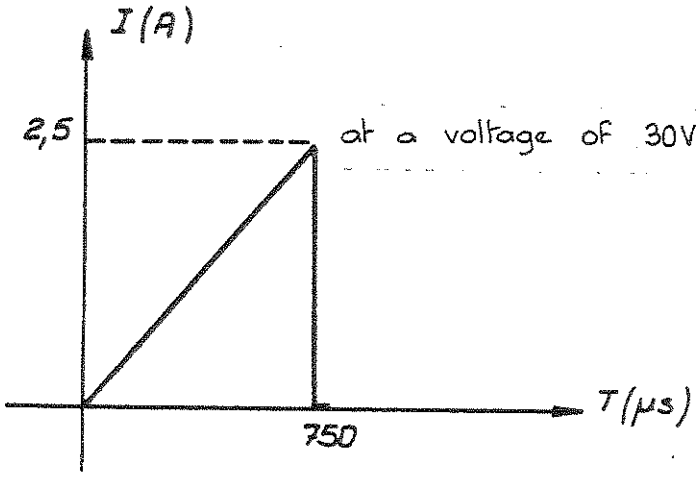
5 – PRINTING

5.1 PRINTING DEVICE

5.1.1 Characteristics

-- Writing speed	: 15 characters/s
-- Electromagnet power supply voltage (see NOTE)	: 30 V ± 2 %
-- Electromagnet excitation time (see NOTE)	: 750 µs ± 10 µs

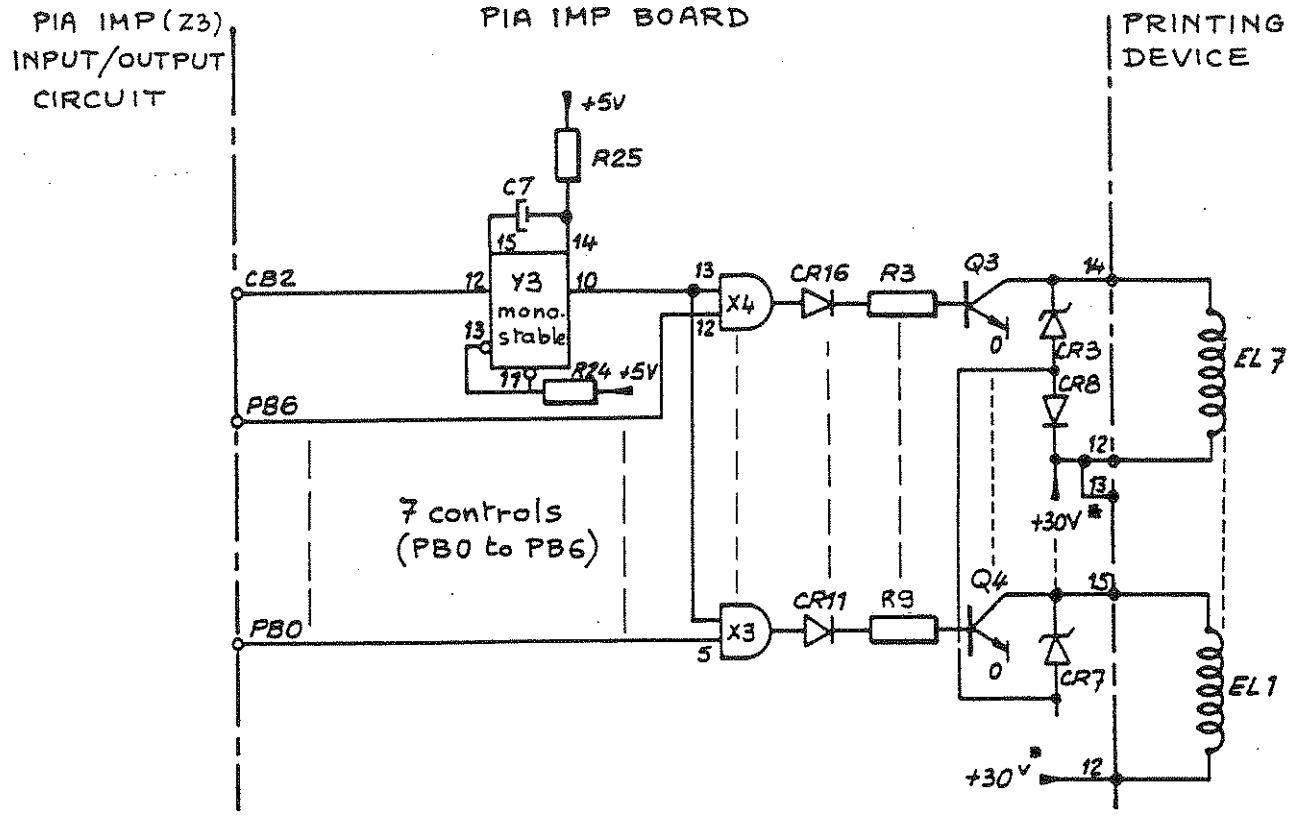
NOTE : The electromagnets are excited by a signal with the following characteristics :



5.1.2 PRINTING DEVICE INPUT-OUTPUT CIRCUIT

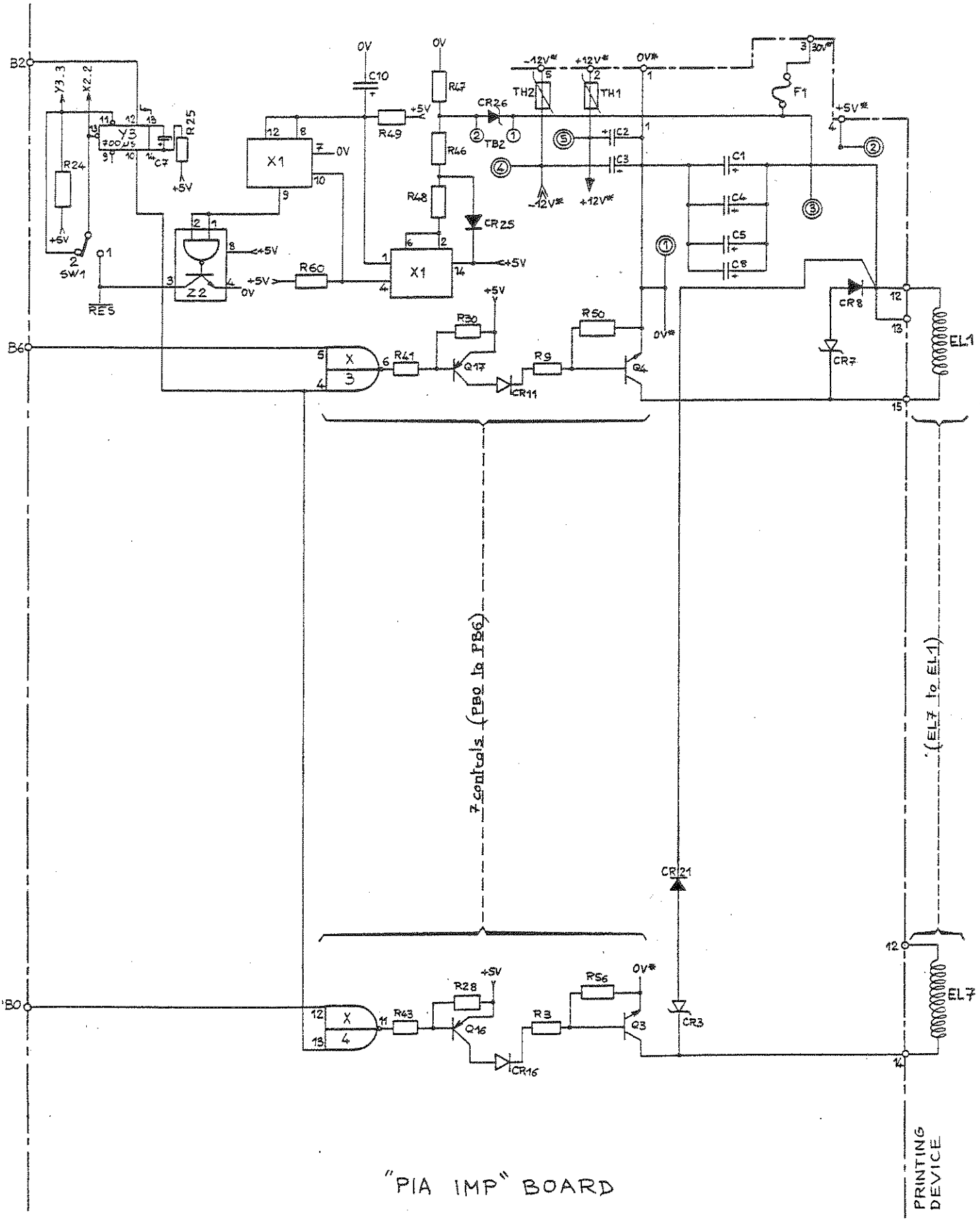
(«PIA IMP» board, plate 5-1)

The control of the 7 electromagnets (EL1 to EL7) of the PRINTING DEVICE needles is provided by 7 identical amplifiers. The amplifiers are controlled by signals "PB0" to "PB6" supplied by the "PIA IMP" input-output circuit (Z3).



The needle controls "PB0" to "PB6" are validated by a pulse supplied by the monostable (Y3). The monostable is triggered by the signal "CB2" from the "PIA IMP" input-output circuit (Z3).

The diodes (CR1 to CR8), connected in parallel to the coils of the electromagnets (EL1 to EL7), clamp the overvoltages at the blocking of transistors (Q1 to Q7) controlling the electromagnets.


"PIA IMP" BOARD
PRINTING DEVICE
7 controls (PB0 to PB6)
(EL7 to EL1)
B2
B6
B0
Y3.3
X2.2
Y3
700µs
C7
R25
R24
SW1
RES
X1
Z2
C10
R47
R49
R46
R48
CR26
CR25
TB2
TH2
TH1
-12V*
+12V*
0V*
30V*
F1
+5V*
C1
C2
C3
C4
C5
C6
R60
R30
R41
Q17
R9
CR11
R50
Q4
CR8
CR7
EL1
CR21
R28
R43
Q16
R3
CR16
R56
Q3
CR3
EL7

5.1.3 Complementary data

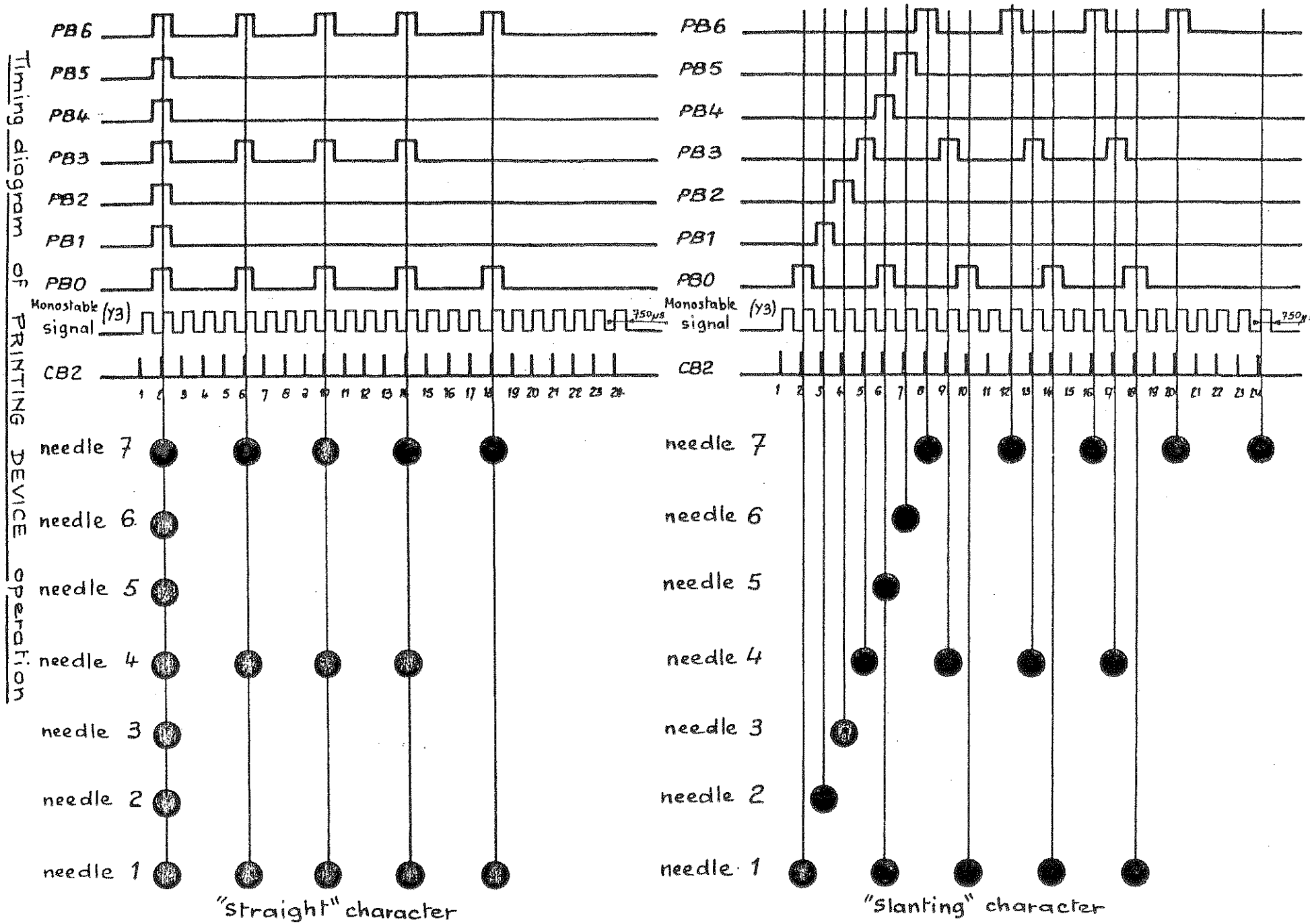
SUPERVISION OF + 30 V*

(«PIA IMP» board, plate 5-2)

In case of absence of PRINTING DEVICE control voltage (+ 30 V*) (i.e. fuse F1 blowed) or if its value is lower than 21 V for over 80 ms, a reinitialization of the unit is triggered automatically.

As much as the default persists, that reinitialization is maintained permanently, and the unit cannot be utilized.

That function is realized through a circuit constituted by triggers (X1) which control the signal «RES» (Restart) through the amplifier (Z2).


Timing diagram of PRINTING DEVICE operation
PB6
PB5
PB4
PB3
PB2
PB1
PB0
Monostable signal (Y3)
750μs
CB2
needle 7
needle 6
needle 5
needle 4
needle 3
needle 2
needle 1
"Straight" character
"Slanting" character

5.2 ADVANCE AND RETURN-TO-BEGINNING OF LINE SYSTEM

(SENSOR, "ASSERVISSEMENT" board, POWER AMPLIFIER, DRIVE MOTOR)

NOTE CONCERNING THIS PARAGRAPH: The symbol * , following some signals allows them to be distinguished from their homonyms (e.g. "Col" and "Col*").

5.2.1 General

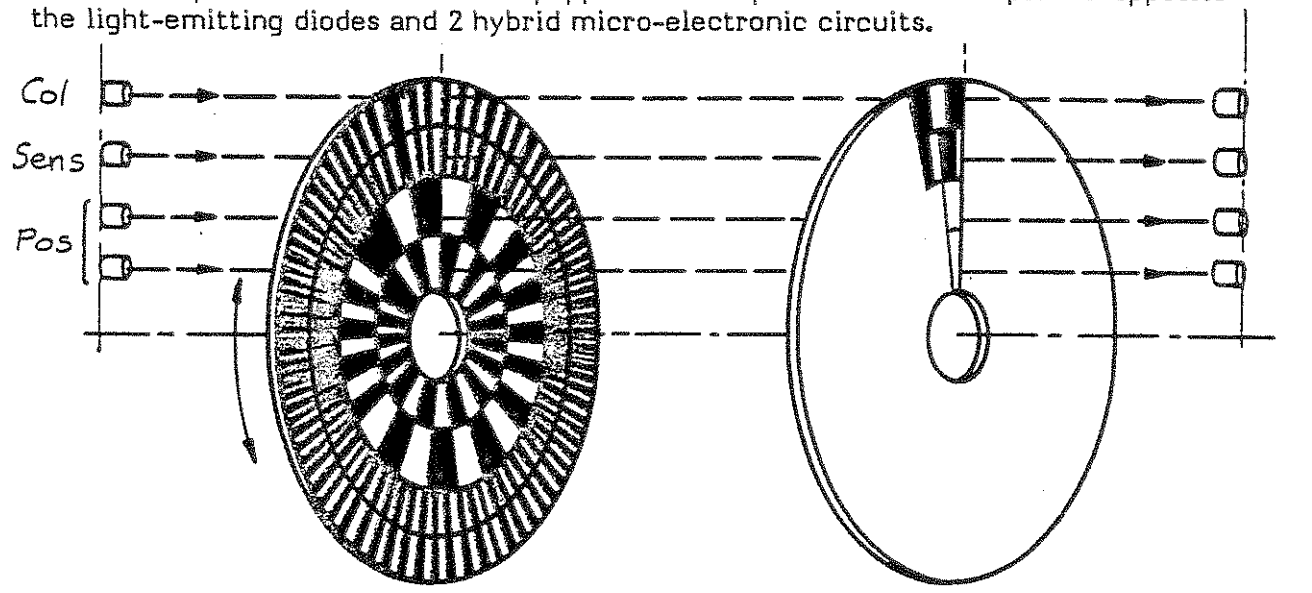
The advance and return-to-beginning of line system consists of several functional units :

- SENSOR
- Logic data generator circuit
- Tachogenerator
- Digital-to-analog converter
- Servo controls
- Selection and summing circuit
- DRIVE MOTOR amplifier
- DRIVE MOTOR

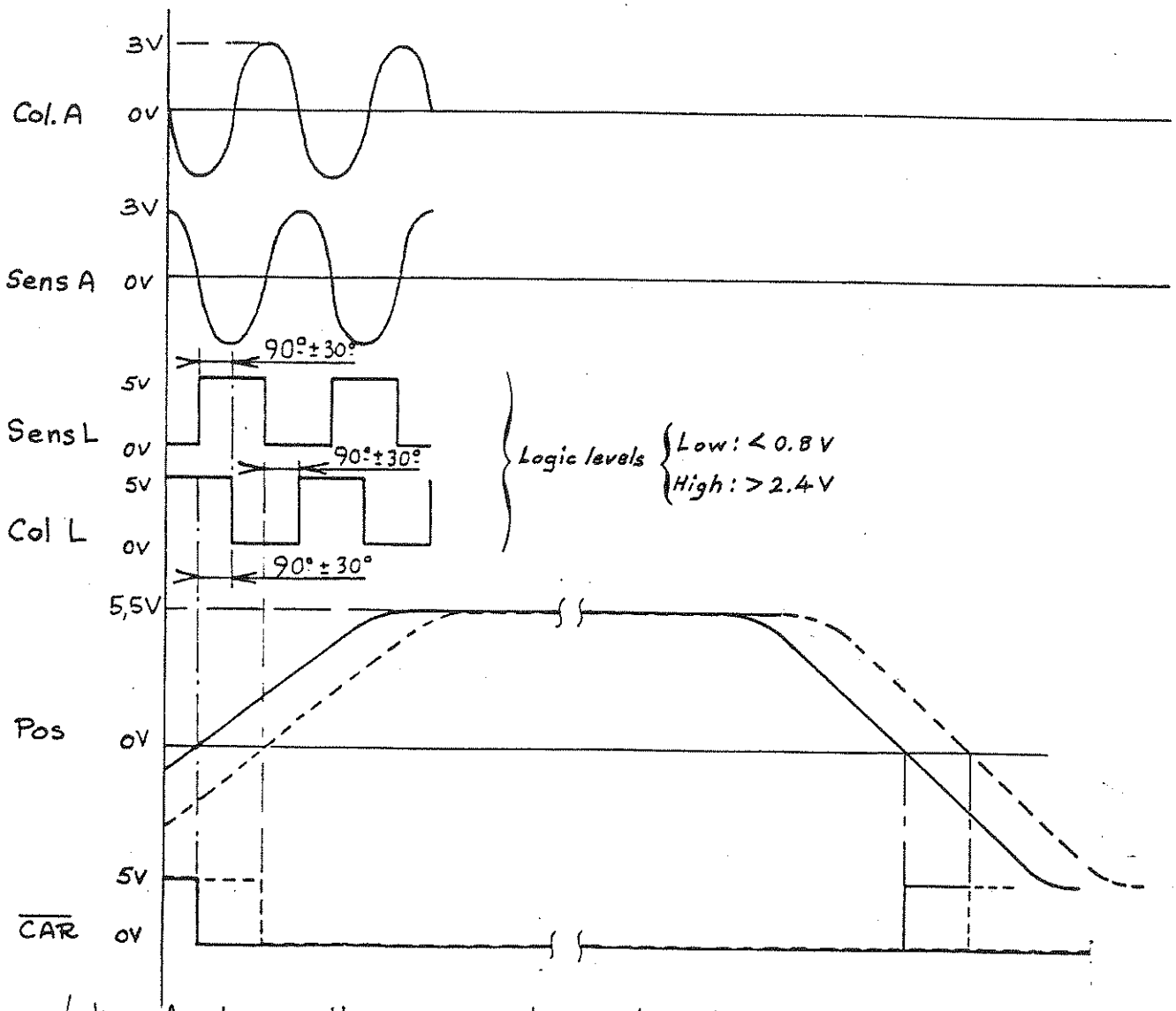
5.2.2 SENSOR

The SENSOR basically consists of :

- a transmitter printed circuit board equipped with 4 light-emitting diodes placed along the same radius,
- a mobile glass disc representing 4 coaxial tracks, each formed of alternating black and transparent sectors, i.e. :
  - track 1 known as Column "Col" ,
  - track 2 known as Direction "Sens",
  - track 3 known as Negative Position "Pos -",
  - track 4 known as Positive Position "Pos +",
- a fixed mask or diaphragm, made of glass and containing a window consisting of 4 coaxial tracks, i.e. :
  - track 1 known as Column "Col",
  - track 2 known as Direction "Sens",
  - track 3 known as Negative Position "Pos -",
  - track 4 known as positive Position "Pos +",
- a receiver printed circuit board equipped with 4 photo-transistors placed opposite the light-emitting diodes and 2 hybrid micro-electronic circuits.



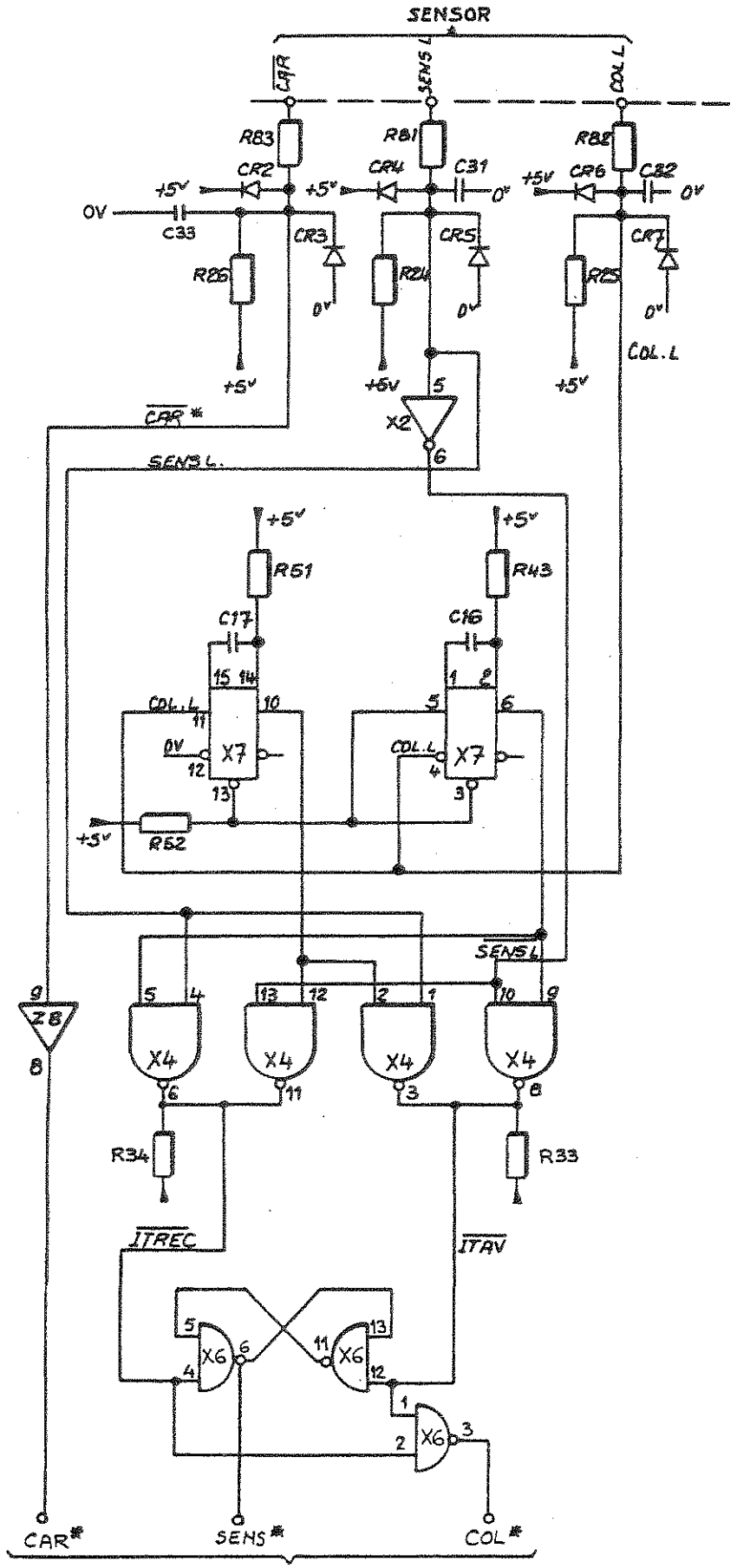
The micro-electronic circuit amplifies the "Col" and "Sens" signals with a constant gain. The "Pos +" and "Pos -" signals drive a differential amplifier whose output supplies the "Pos" synthesis signal. The "Col" and "Sens" signals are amplified and output directly in the form of Analog Column signal "Col A" and Analog Direction signal "Sens A". They are used to generate the Logic Column signal "Col L" and Logic Direction signal "Sens L". The "Pos" signal is used to generate the Character logic signal "$\overline{CAR}$".



Note: Analog voltages are typical values.

Timing diagram of signals supplied by the SENSOR

A character represented by one period of the «$\overline{CAR}$» signal contains 14 columns, i.e.14 low to high edges or high to low edges.



"PIA IMP" board, "PIA IMP" input-output circuit (Z3)

Logic data generator circuit

5.2.3 LOGIC DATA GENERATION CIRCUIT

("ASSERVISSEMENT" board)

The logic data generation circuit consists of :

- a circuit generating "$\overline{\text{ITAV}}$" (drive) and "$\overline{\text{ITREC}}$" (carriage return) interrupt signals,
- a unit converting the "$\overline{\text{ITAV}}$" and "$\overline{\text{ITREC}}$" signals into "Sens*" (direction) and "Col*" (column) signals required by the microprocessor,
- a circuit inverting the "$\overline{\text{CAR}}$" (character) signal.

The "$\overline{\text{CAR}}$" logic signal coming from the SENSOR is complemented by the inverter (Z8-8) (see NOTE) which supplies the "CAR*" signal. The "Col L" (Column Logic) signal from the SENSOR triggers the monostable flip-flops (X7-6) on a low to high edge and (X7-10) on a high to low edge.

The "Sens L" (Direction Logic) signal from the SENSOR is applied directly to the NAND gates (X4-6) and (X4-3) and is also complemented by the inverter (X2-6) the output of which drives the NAND gates (X4-8) and (X4-11).

The resistors (R24 to R26) at + 5 V load the open-collector outputs of the SENSOR.

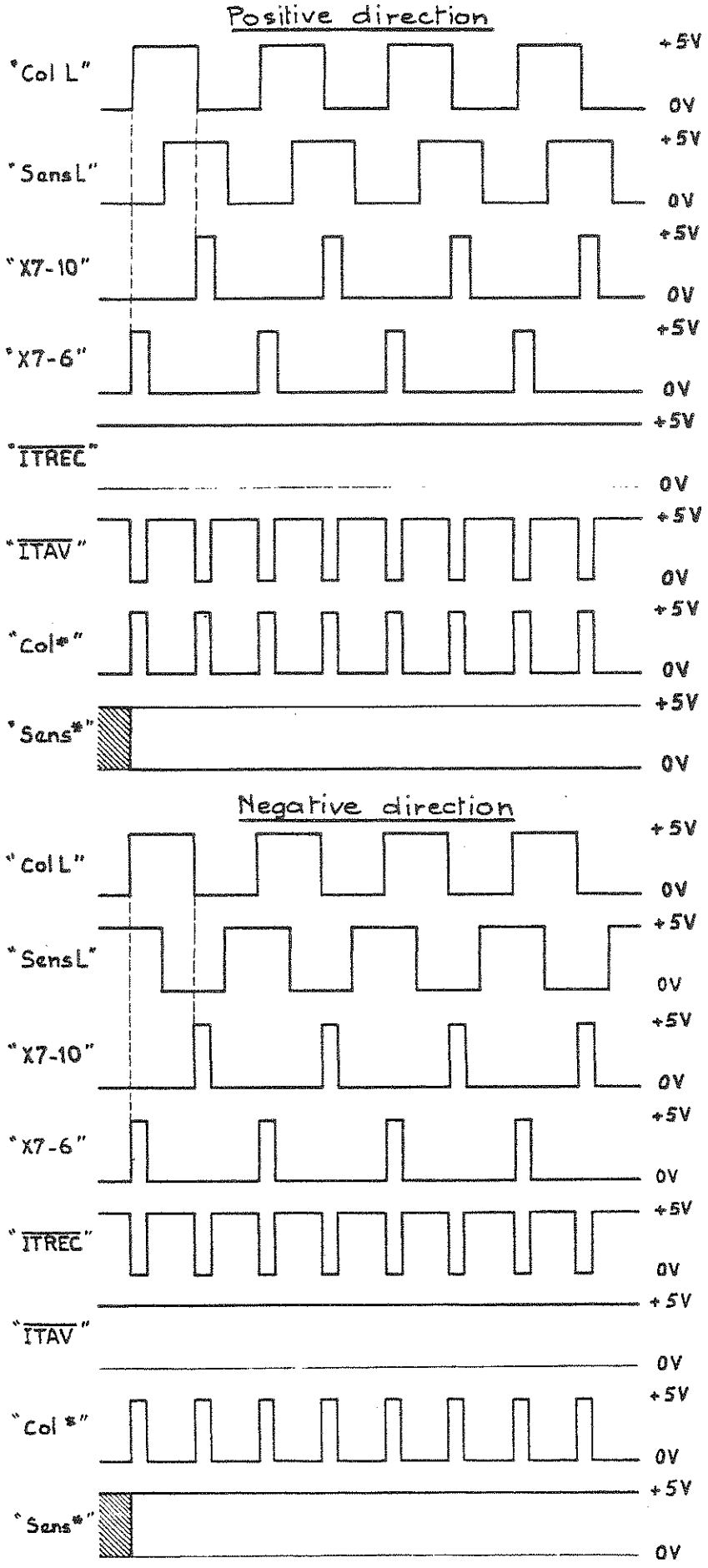
The diodes (CR2 to CR7) protect the logic stages against any possible overvoltages.

Interference present in the input signals are filtered by the following RC circuits :

- "$\overline{\text{CAR}}$" : R83 - C33
- "Col L" : R82 - C32
- "Sens L" : R81 - C31

The gates (X4), loaded by the resistors (R33) and (R34) combine the "Sens L", "$\overline{\text{Sens L}}$" and "X7-6", "X7-10", signals, two by two, in order to obtain the "$\overline{\text{ITREC}}$ and "$\overline{\text{ITAV}}$" signals. (X7-6) and (X7-10) pulse duration : 120 µs typical each.

NOTE : Inverter (Z8-8) signifies the inverter corresponding to ouput (8) of package (Z8).



LOGIC DATA TIMING DIAGRAMS

In the Drive mode, in the positive direction, gates (X4-8) and (X4-3) supply pulses on "$\overline{\text{ITAV}}$" whereas "$\overline{\text{ITREC}}$" obtained from gates (X4-6) and (X4-11) is at level "1". In the Carriage Return mode, in the negative direction, "$\overline{\text{ITAV}}$" changes to "1" and the pulses appears at "$\overline{\text{ITREC}}$".

The RS flip-flop stores the carriage drive or return status on the basis of the "$\overline{\text{ITAV}}$" and "$\overline{\text{ITREC}}$" signals and supplies the "Sens*" signal to the "PIA IMP" input-output circuit (Z3).

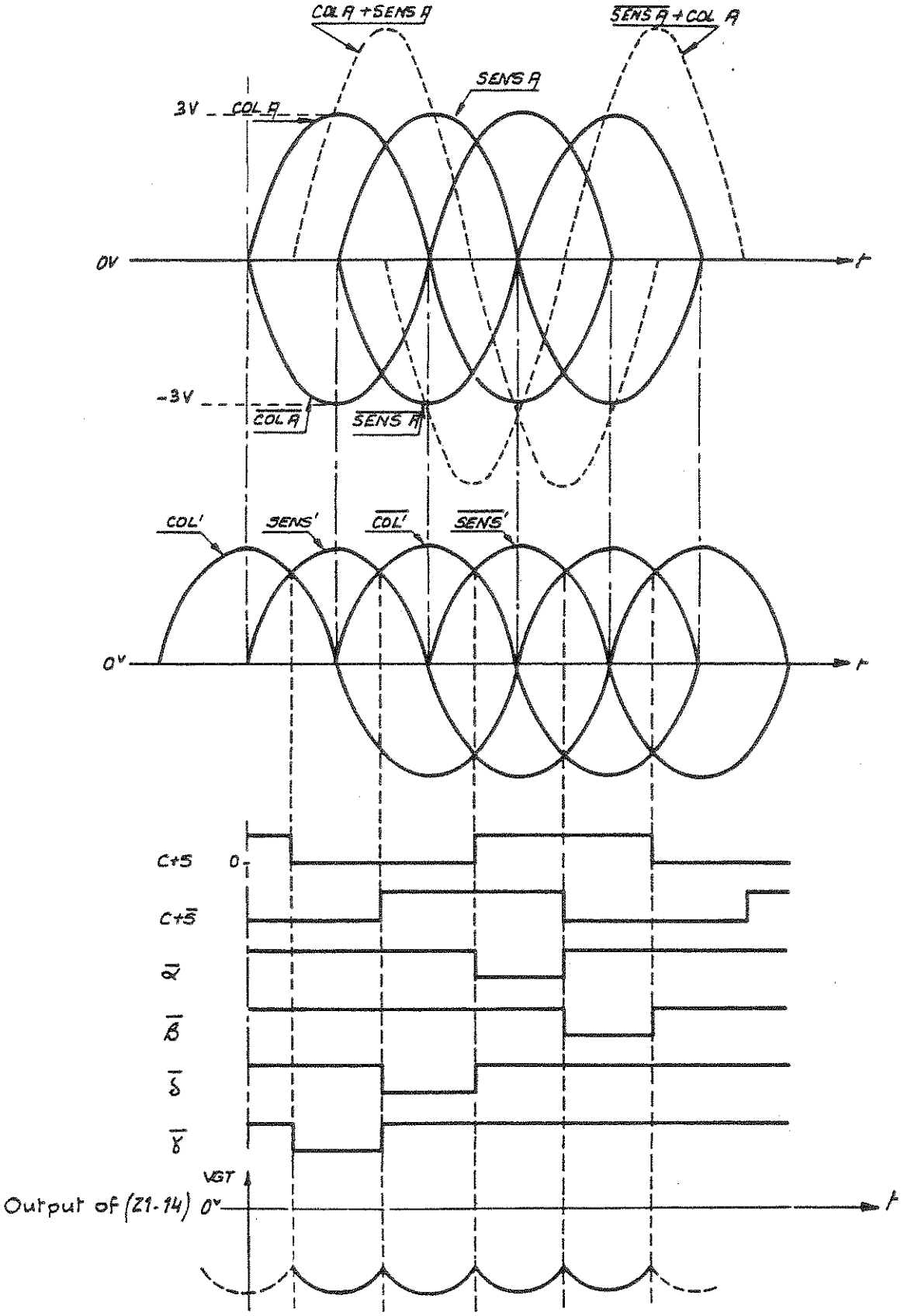
The NAND gate (X6-3) (see NOTE), combines the "$\overline{\text{ITAV}}$" and "$\overline{\text{ITREC}}$" signals to supply the "Col*" signal to the "PIA IMP" input-output circuit (Z3).

The "Sens*" signal informs the microprocessor of the carriage movement mode. The "CAR*" signal enables the microprocessor to down-count the characters in the line of writing from 69 to 32 and then from 31 to 1, in the Carriage Return mode (see paragraph : "Selection and Summing circuit" for down-counting). The "Col*" signal is used for :

- counting the columns of a character in the following mode : Position Servo-control (carriage halt), Speed Servo-control (drive) and Out-of-position Servo-control (position shift),

- for down-counting the 28 columns of the 1st character in the Carriage Return mode at the start of a line, in order to increase the precision of the Servo-control.

NOTE : NAND gate (X6-3) signifies : the "NAND" gate corresponding to output (3) of package (X6).



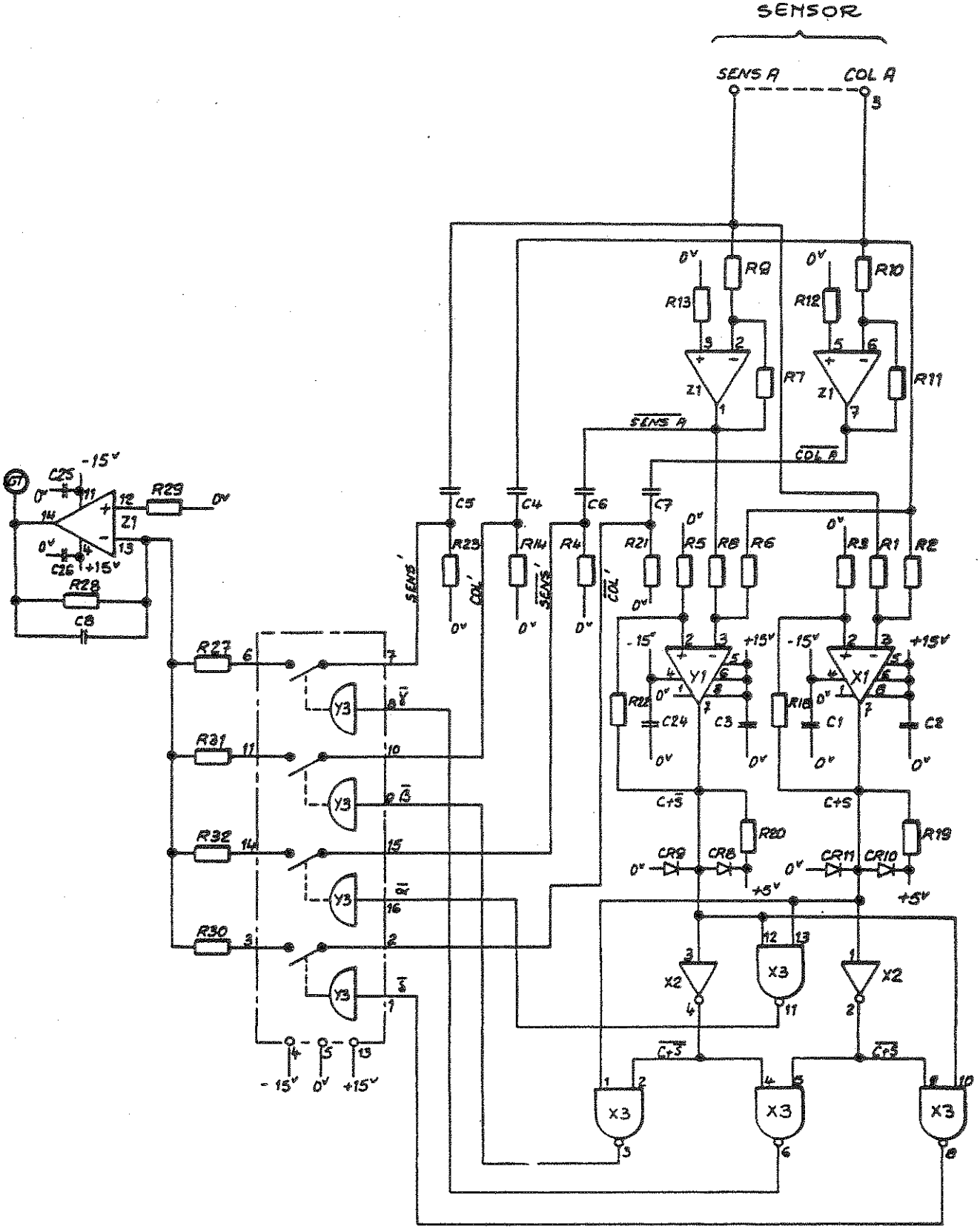
Timing diagram of tachogenerator

5.2.4 Tachogenerator

("ASSERVISSEMENT" board)

The Tachogenerator consists of an electronic circuit generating the true speeed signal from analog coming from the SENSOR.

The SENSOR supplies analog "Sens" (direction) and "Col" (column) signals with a constant amplitude and a variable frequency proportional to the speed of rotation of the mobile disc, i.e. to the speed of movement of the carriage. From the derivative of the signals and their complements, 4 signals are obtained, phase-shifted 90° with respect to one another, and whose amplitude is proportional to the frequency. By combining the basic signals and their complements, the electronic circuit generates logic signals used for sampling the higher or lower peaks of the derived signals and, according to the direction of rotation, provide a d-c voltage the instantaneous value of which is directly proportional to the true speed of the carriage at that moment.



Tachogenerator

The "Sens A" and "Col A" signals from the SENSOR are inverted by the operational amplifiers (Z1-1) (See NOTE) and (Z1-7) in order to obtain the "$\overline{\text{Sens A}}$" and "$\overline{\text{Col A}}$" signals.

The operational amplifiers (Y1) and (X1) are Schmitt trigger connected. They receive respectively the sums of "$\overline{\text{Sens A}}$" and "Col A" via (R8) and (R6), and of "Sens A" and "Col A" via (R1) and (R2). At the output, they supply the respective logic signals "C + $\overline{\text{S}}$" and C + S". As these amplifiers have an open-collector output, + 5 V is applied to this output through resistors (R20) and (R19).

The purpose of diodes (CR8, CR9, CR10 and CR11), is to protect the following logic inputs by clamping, at 0 V and + 5 V, the changeover of the amplifiers to positive or negative saturation when the equipment is turned on.

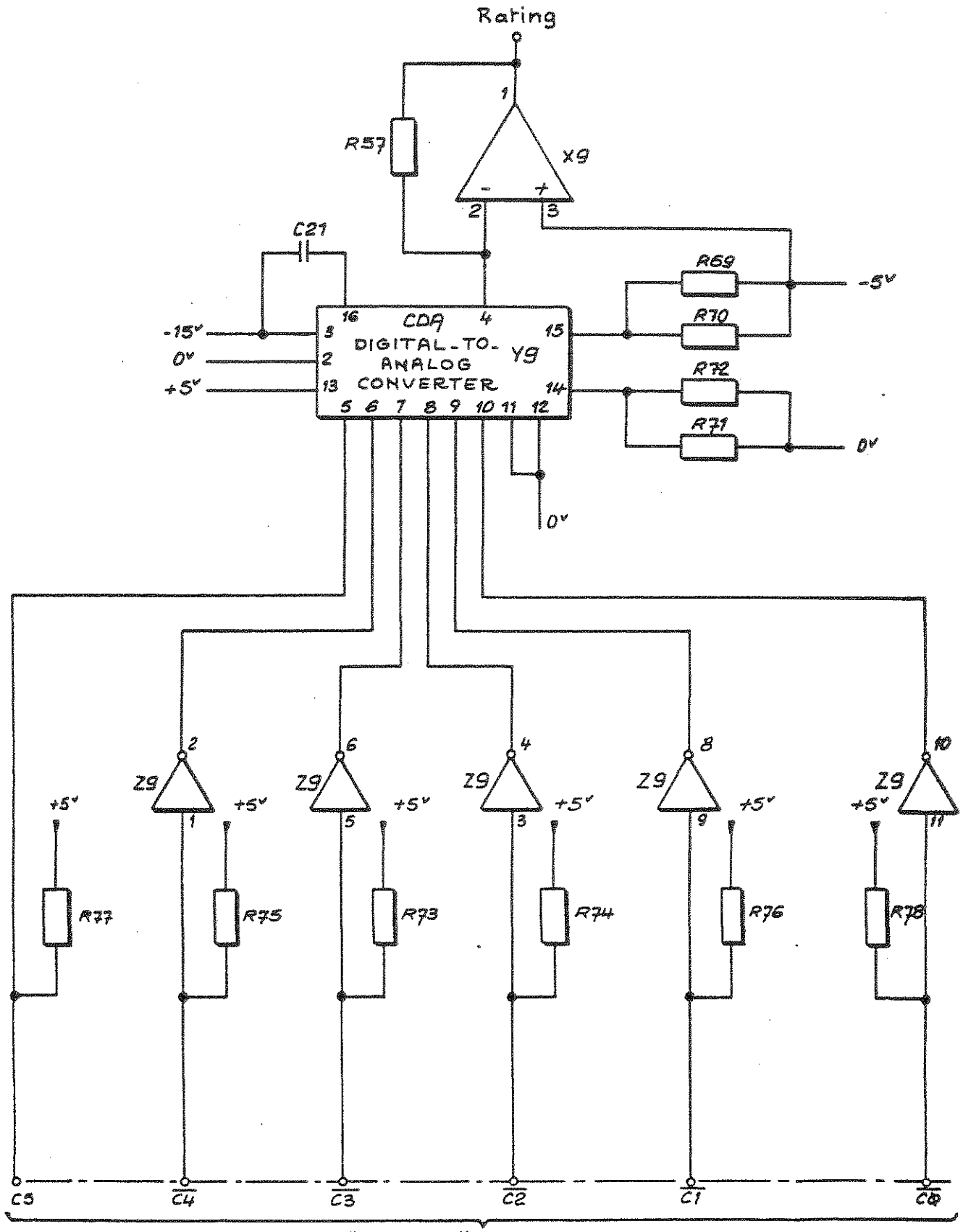
The inverters (X2-4) and (X2-2) respectively receive signals "C + $\overline{\text{S}}$" and "C + S" and supply signals "$\overline{\text{C + S}}$" and "$\overline{\text{C + S}}$".

NAND gate (X3-11) receives signals "C + S" and "C + S" and supplies synthesis signal "$\overline{\alpha}$" which controls electronic switch (Y3-16).

The control signals "$\overline{\beta}$", "$\overline{\delta}$" and "$\overline{\gamma}$" of the electronic switches (Y3-9), (Y3-1) and (Y3-8) are supplied respectively by NAND gates (X3-3), (X3-8) and (Y3-6) from and in order, signals "C + S" and "$\overline{\text{C + S}}$", "C + $\overline{\text{S}}$" and "$\overline{\text{C + S}}$", and "C + $\overline{\text{S}}$" and "C + S".

The electronic switches (Y3) thus allow sequential transmission of the upper part of the positive half sinewave of each of the "Sens' ", "Col' ", "$\overline{\text{Sens' }}$", "$\overline{\text{Col' }}$ " signals. These signals are obtained from respective signals "Sens A", "Col A", "$\overline{\text{Sens A}}$" and "$\overline{\text{Col A}}$" after passing through circuits (R23-C5), (R14-C4), (R4-C6) and (R21-C7). The signals are applied to the "contacts" of the switches in order to be summed together once the switches are closed ; the summing is applied to the negative input of the operational amplifier (Z1-14) which supplies an almost continuous inverted signal whose level is proportional to the true speed of the carriage.

NOTE : Operational amplifier (Z1-1) signifies : operational amplifier corresponding to output (1) of package (Z1).



"PIA IMP" board
("PIA IMP" input-output circuit(Z3))

Digital-to-analog converter

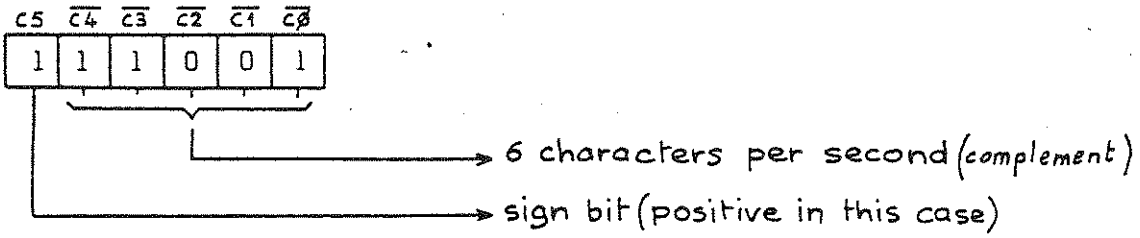
5.2.5 Digital-to-analog converter
("ASSERVISSEMENT" board)

The "PIA IMP" input-output circuit (Z3) on the "PIA IMP" board supplies 6 logic signals "$\overline{C\emptyset}$", "$\overline{C1}$", "$\overline{C2}$", "$\overline{C3}$", "$\overline{C4}$" and "C5" known as the "speed rating", which represent the maximum theoretical typing speed corresponding to telegraph operation speed.

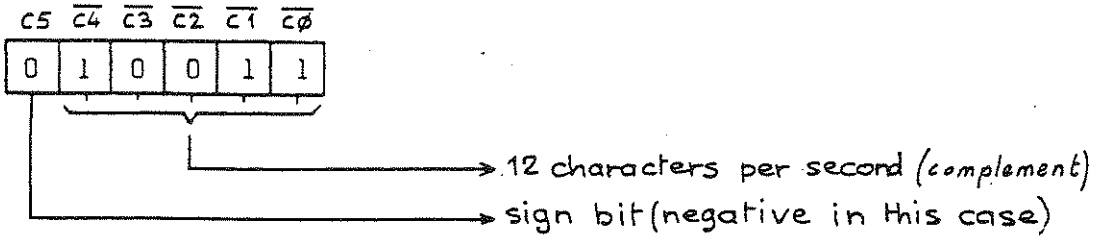
These signals subdivided into 5 movement speed bits "$\overline{C\emptyset}$" to "$\overline{C4}$" and one movement direction bit or sign "C5" which has the value "1" for positive movement from the left to the righ, and "0" for a negative movement from the right to the left. The advance speeds are coded in binary.

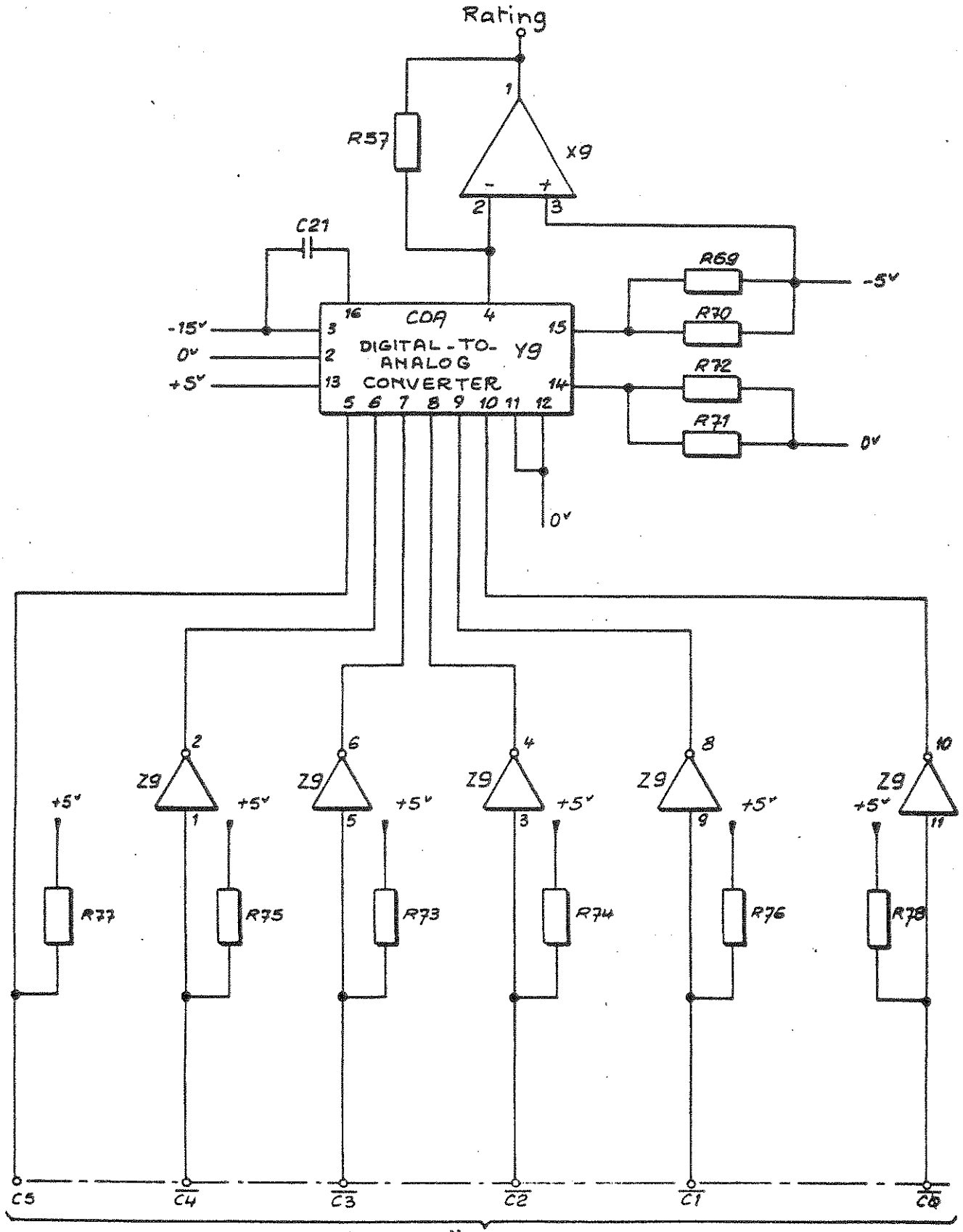
Example

For a maximum permitted speed of 6 characters per second, the rating is :



For a maximum permitted speed of 12 characters per second, the rating is :





"PIA IMP" board
("PIA IMP" input_output circuit (Z3))

Digital-to-analog converter

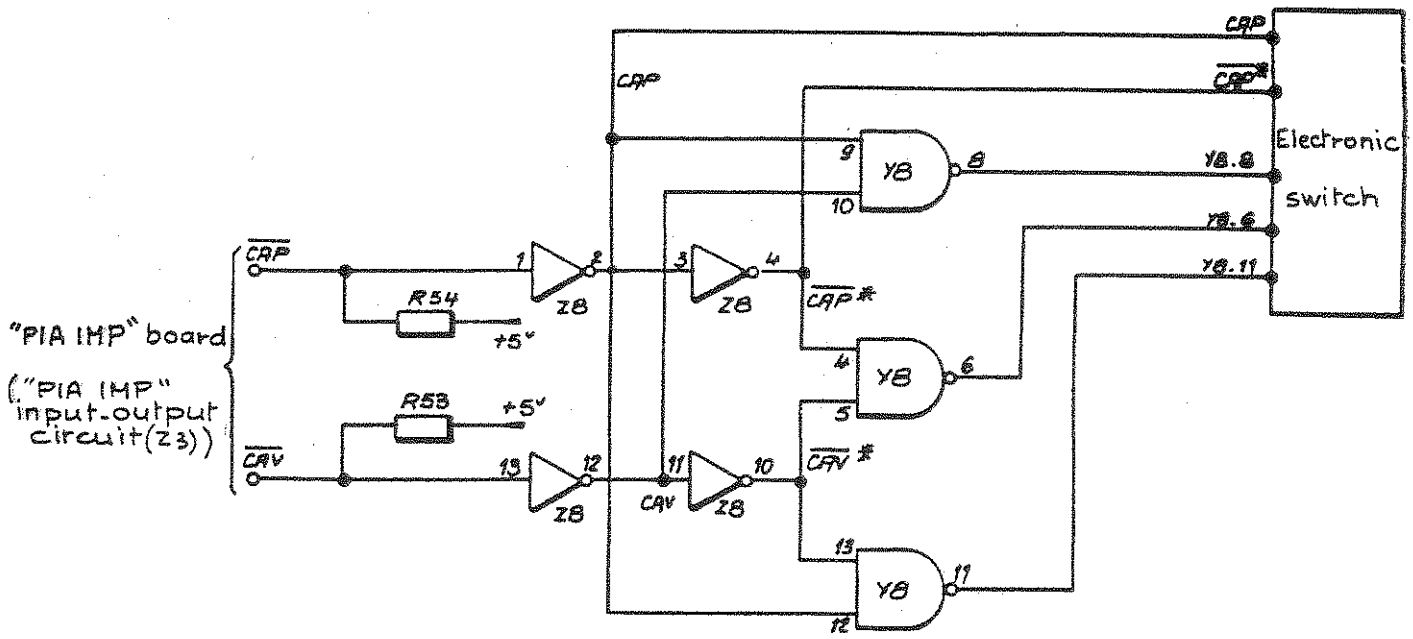
The rating "111111" corresponds to the stoppage of the PRINTING DEVICE whereas rating "000000" is used to order maximum acceleration (saturation of the DRIVE MOTOR amplifier) during a carriage return.

The digital-to-analog converter circuit is designed to transform the digital speed rating signals into a synthesis analog signal in order to compare it to the true speed and position signals.

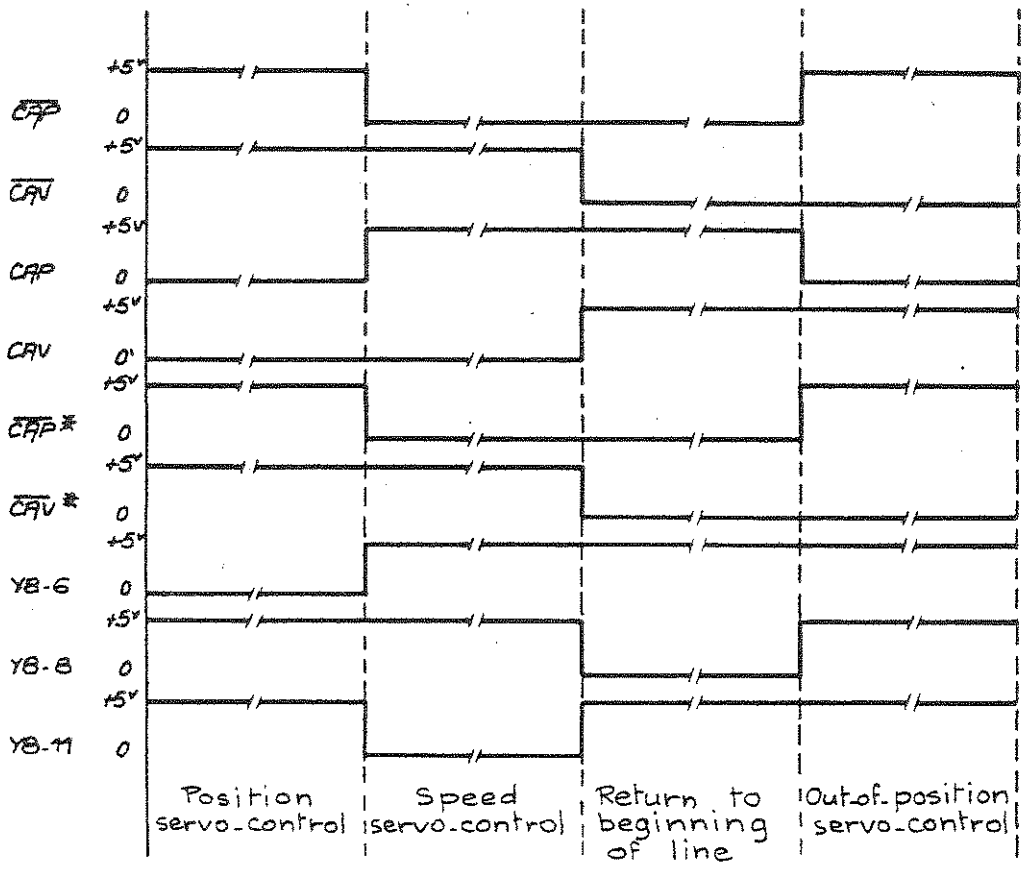
The signals "$\overline{C\emptyset}$" to "$\overline{C4}$" are complemented by inverters (Z9-10) (see NOTE), (Z9-8), (Z9-4), (Z9-6) and (Z9-2) and then applied to the digital inputs of the digital-to-analog converter "CDA" (Y9) which generates a DC current whose value depends on a binary code applied to its input. This current is converted into an "Rating" amplified voltage by operational amplifier (X9). It is used in the selection circuit.

The resistors (R77), (R75), (R73), (R74), (R76), and (R78) supply logic level "1" at the inputs of inverters (Z9) and digital-to-analog converter "CDA" (Y9) by a connection to the +5 V.

NOTE : Inverter (Z9–10) signifies : the inverter corresponding to output (10) of package (Z9).



Servo-controls



Timing diagram of servo-controls

5.2.6 Servo-controls

("ASSERVISSEMENT" and "PIA IMP" boards)

The Servo-controls are provided from an input-output circuit (Z3) located on the "PAI IMP" board by a wired logic circuit.

The input-output circuit (Z3) supplies logic speed and position Servo-control signals which, combined with their complements, order the opening or closing of the electronic switches in the selection circuit according to the Servo-control mode to be provided.

The various Servo-control modes are as follows :

- position Servo-control (start of line or character),
- speed Servo-control (carriage advance),
- return to beginning of line (carriage return),
- out-of-position Servo-control (positive or negative overshoot of more than 3 columns with respect to the position control).

Operating details of each configuration are given in the paragraph entitled "Selection and Summing Circuit".

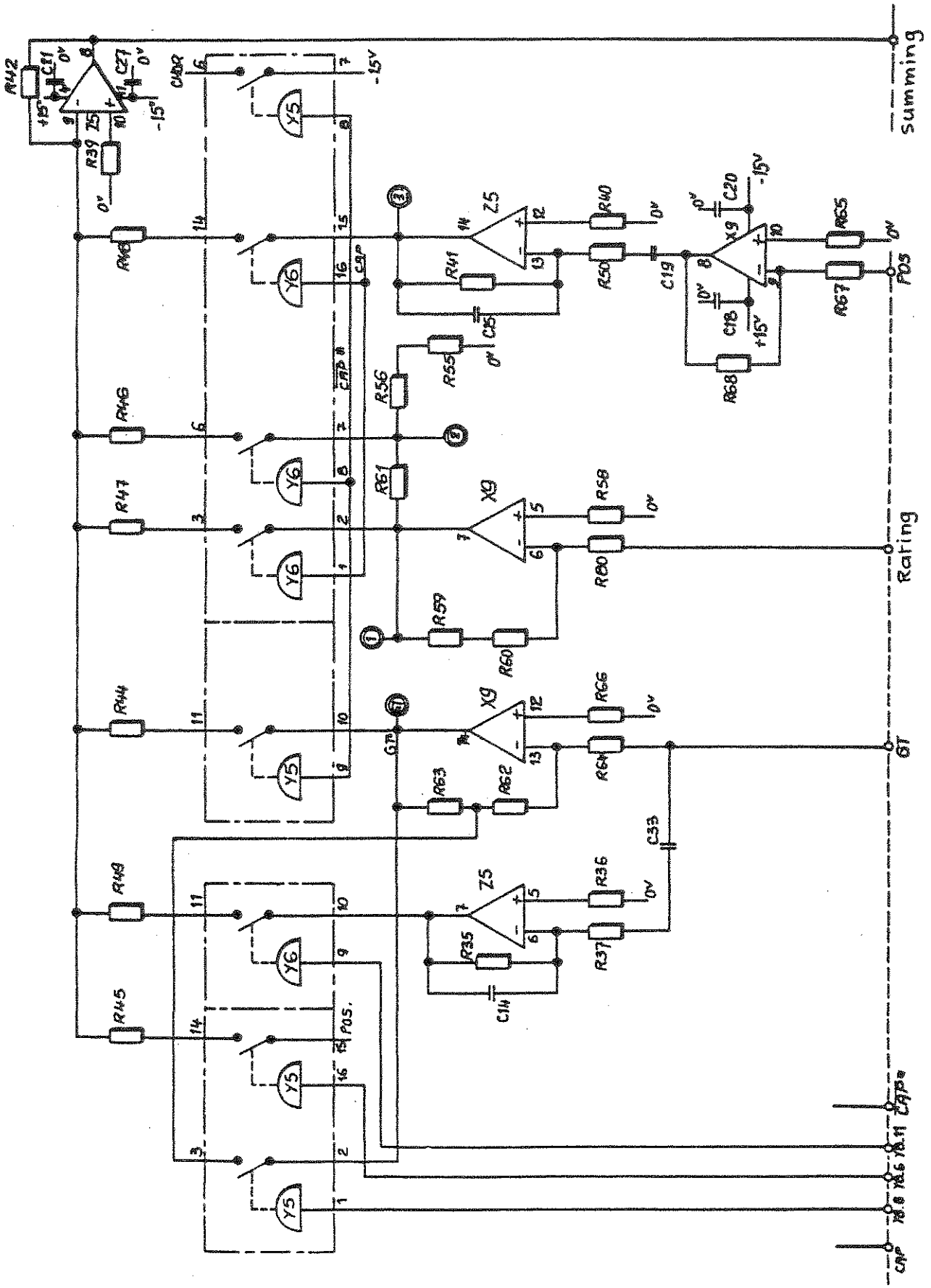
The "$\overline{CAP}$" position Servo-control and "$\overline{CAV}$" speed Servo-control signals, coming from the input-output circuit (Z3) are amplified and complemented by two inverters (Z8–2) (see NOTE) and (Z8–12) which supply respective signals "CAP" and "CAV".

The signals "CAP" and "CAV" are amplified and complemented by the two inverters (Z8–4) and (Z8–10) which provide signals "$\overline{CAP}^{*}$" and "$\overline{CAV}^{*}$".

The NAND gates (Y8–8), (Y8–6) and (Y8–11) produce respective control signals (Y8–8), (Y8–6) and (Y8–11) from the "CAP" and "CAV", "$\overline{CAP}^{*}$" and "$\overline{CAV}^{*}$", and "$\overline{CAV}^{*}$" and "CAP" data.

The resistors (R54) and (R53) supply the logic level "1" at the input of inverters (Z8-2) and (Z8-12) by connection to the + 5 V.

NOTE : Inverter (Z8–2) signifies : inverter corresponding to output (2) of package (Z8).



Selection and summing circuit

5.2.7 Selection and summing circuit

("ASSERVISSEMENT" board)

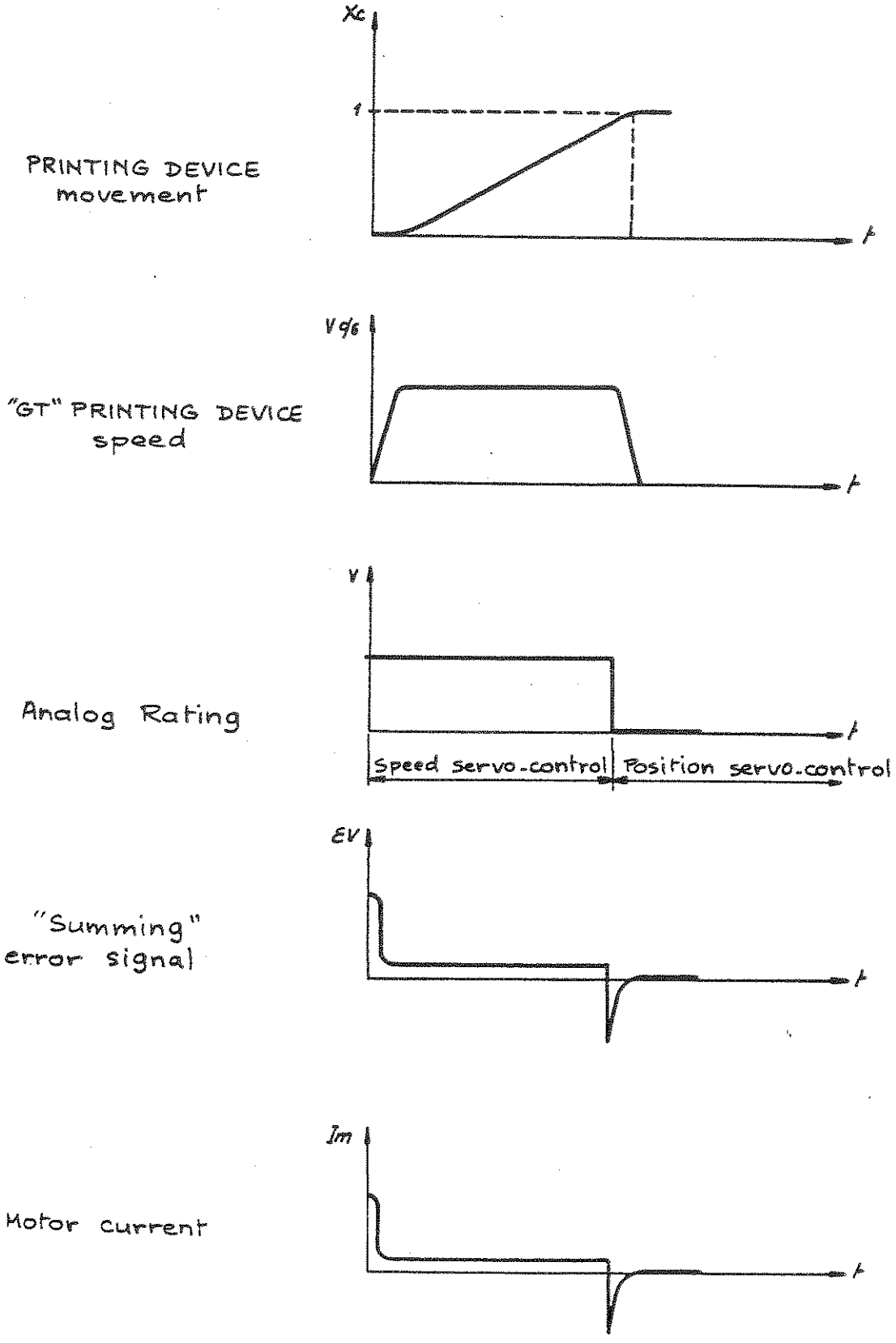
The purpose of the selection and summing circuit is to sum the signals corresponding to the maximum theoretical speed, the true speed and the position of the PRINTING DEVICE according to the operating mode governed by the Servo-control signals.

To do this, it receives the "Rating", Tachogenerator "GT" and Position "Pos" signals as well as the "CAP" position Servo-control signal, its amplified complement "$\overline{CAP}^*$" and its combinations "Y8–8", "Y8–6" and "Y8–11" with "$\overline{CAP}^*$", the "CAV" speed Servo-control signal and its amplified complement "$\overline{CAV}^*$".

The "Rating" signal from the Digital-to-Analog Converter (Y9) is applied to the operational amplifier (X9-7) through resistor (R80). The output of (X9-7) is applied directly to the electronic switch (Y6-2) (see NOTE) and, through resistor (R61), to electronic switch (Y6-7). The resistors (R56) and (R55) fix the output potential with respect to the power supply O V.

The "GT" signal from the Tachogenerator is applied to operational amplifier (X9-14) through resistor (R64) whose gain is controlled either by resistors (R64) and (R62-R63) when the electronic switch (Y5-2) is open, or by resistors (R64) and (R62) when the switch is closed. The "GT^*" amplified output signal is applied to the electronic switch (Y5-10). In parallel, the "GT" signal is derived and sent to operational amplifier (Z5-7) with its RC filter (R35-C14) whose ouput is applied to electronic switch (Y6-10).

NOTE : Electronic switch (Y6–2) signifies : the switch corresponding to input (2) of package (Y6).



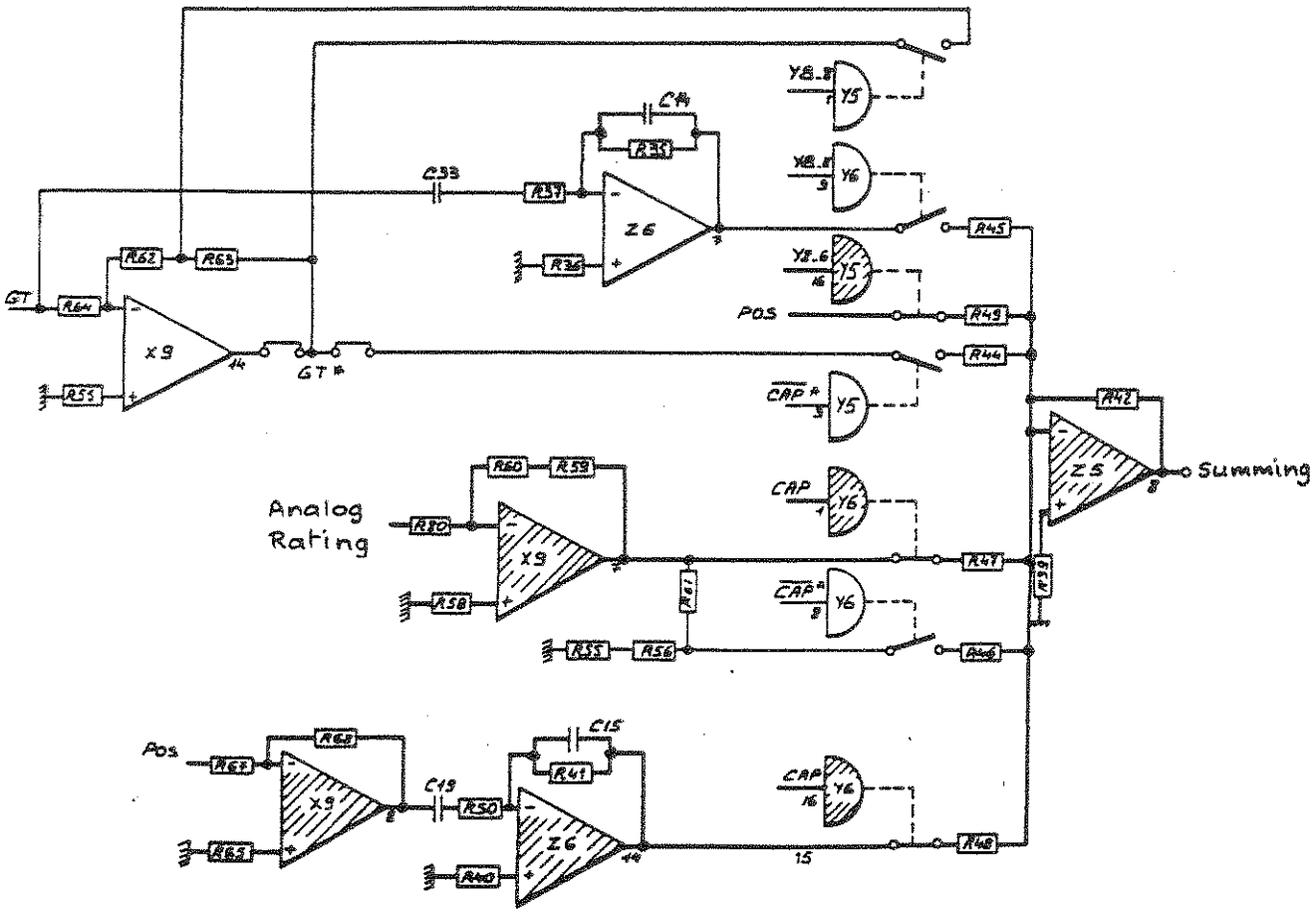
Timing-diagram of analog signals

The "Pos" signal from the SENSOR is applied to operational amplifier (X9-8) the output of which is applied through (C19) and (R50) to operational amplifier (Z5-14) mounted with an RC filter (R41-C15). The output signal from the amplifier appears on electronic switch (Y6-15). Furthermore, the "Pos" signal appears directly on electronic switch (Y5-15).

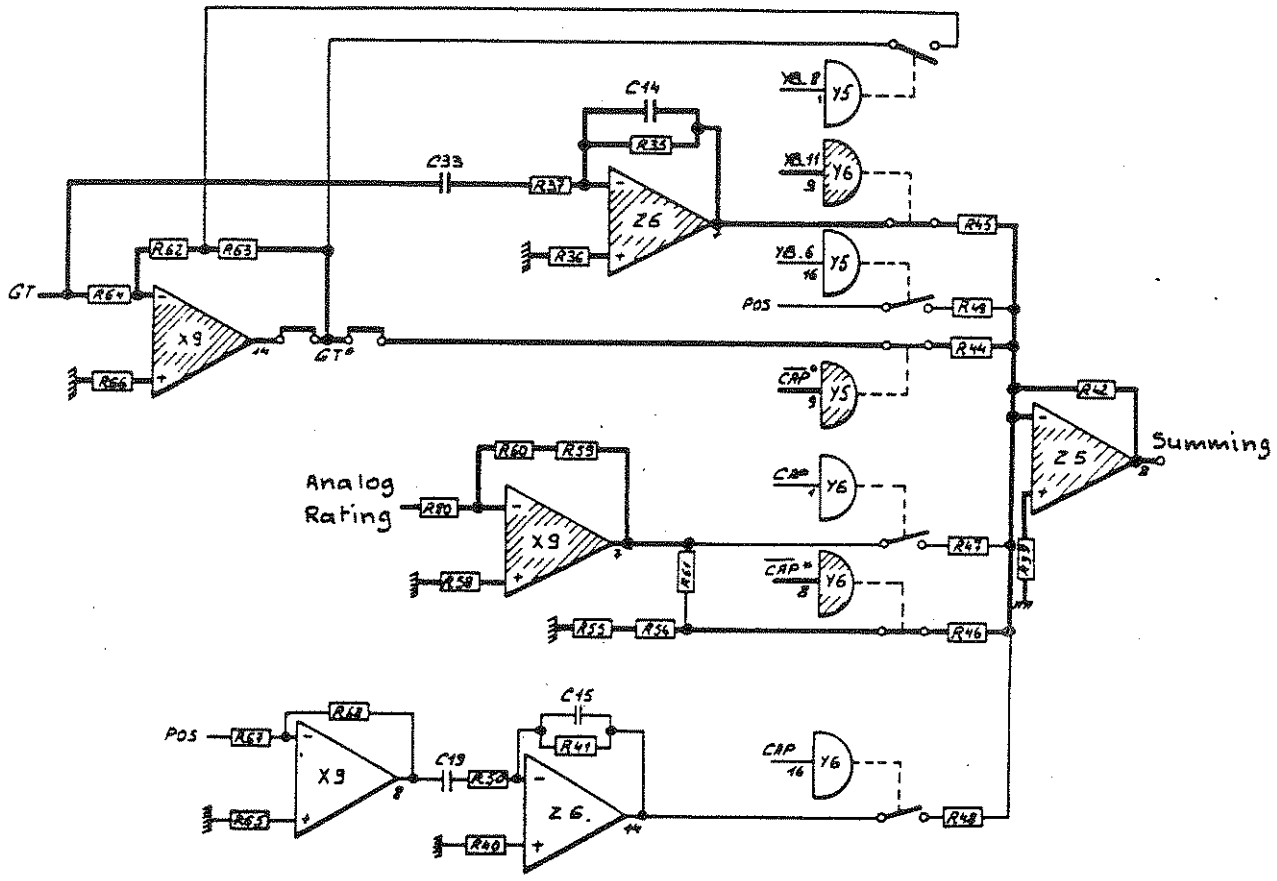
The Servo-control signals (see diagram in "Servo-controls" paragraph) close the switches by setting the gate input to zero. Depending on the operating mode required by the microprocessor, the Servo-control signals close certain contacts in order to sum the signals driving operational amplifier (Z5-8). The produced "Summing" signal controls the DRIVE MOTOR amplifier.

Summings are accomplished through resistors (R45), (R49), (R44), (R47), (R46) and (R48) according to four modes of operation :

- position Servo-control : The operational amplifier (X9–7) supplies a zero "Rating" voltage which is added to the "Pos" signal by controlling the closing of respective switches (Y6–1) and (Y5–16) by the "CAP" and "Y8–6" signals. The operational amplifier (Z5–8) supplies a "Summing" error voltage which controls the DRIVE MOTOR until the carriage stops if it is in motion, or holding the carriage stationary if it is already stopped. The closing of switch (Y6–15) by the "CAP" signal allows the derivative of the "Pos" signals to be added to the two other signals thus confirming the position Servo-control by phase advance correction. This Servo-control mode is retained within a range of ± 3 columns about the theoretical position of the character.



- speed Servo-control : the amplifier (X9–7) supplies a "Rating" voltage corresponding to the requested speed which is summed with the "GT*" signal coming from amplifier (X9–14), by closing respective switches (Y6–8) and (Y5–9) by the "$\overline{CAP}$*" signal. The "Summing" error voltage from amplifier (Z5–8) controls the DRIVE MOTOR. The closing of the switch (Y6–9) by signal "Y8–11" adds the derivative of the "GT" signal to the two other signals in order to stabilize the system by phase advance correction. The electronic switch (Y5–8) controlled by the "$\overline{CAP}$*" signal is not used.



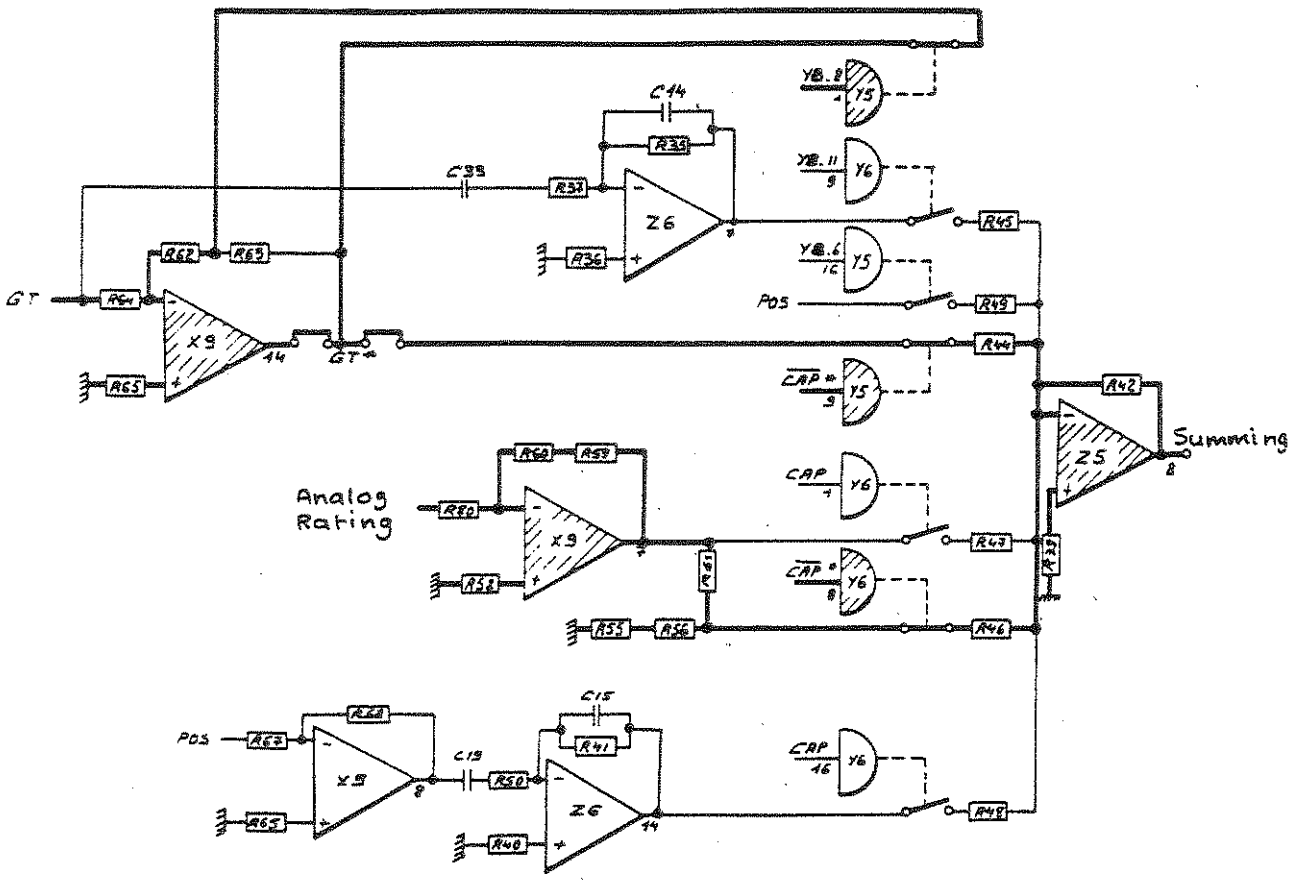
- Return to beginning of line (carriage return) : the operation consists in three separate phases :

  . acceleration of the carriage during which time the speed is maximum, up to detection of the 31st character,

  . deceleration of the carriage by a decreasing analog rating, after the last character whose columns are down-counted.

  . servo-control of the carriage position about the line start position resulting in Position Servo-control.

During the two first phases, the amplifier (X9-7) supplies a maximum, then decreasing, "Rating" voltage which is added to the "GT*" signal by closing the respective switches (Y6-8) and (Y5-9) through the "$\overline{CAP}$*" signal. In parallel, signal (Y8-8) closes switch (Y5-1) which short-circuits resistor (R63) to decrease the gain of the amplifier (X9-14) and make the "Rating" signal preponderant over the "GT*" signal whereby a greater speed is obtained for the same rating. Amplifier (Z5-8) supplies the "Summing" error voltage which controls the DRIVE MOTOR.

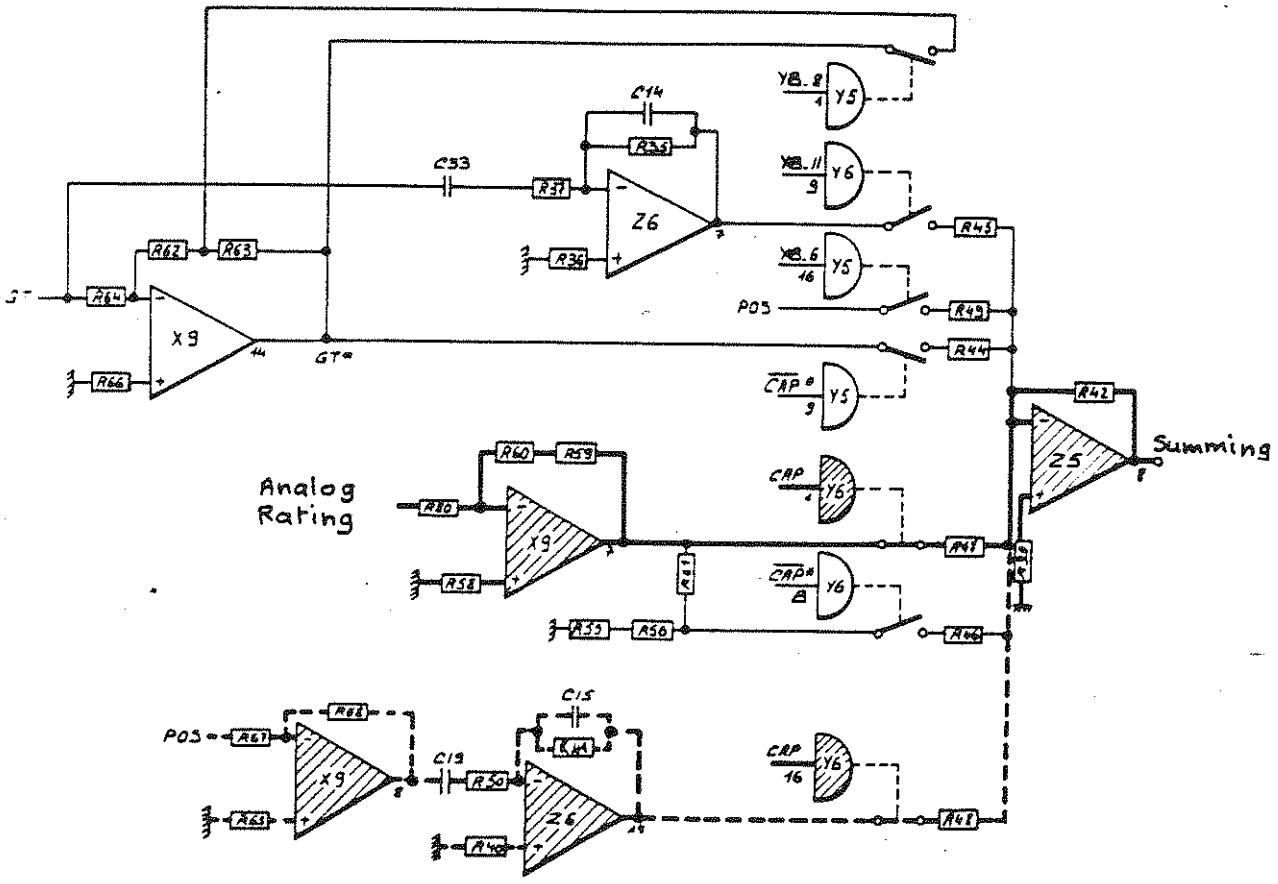


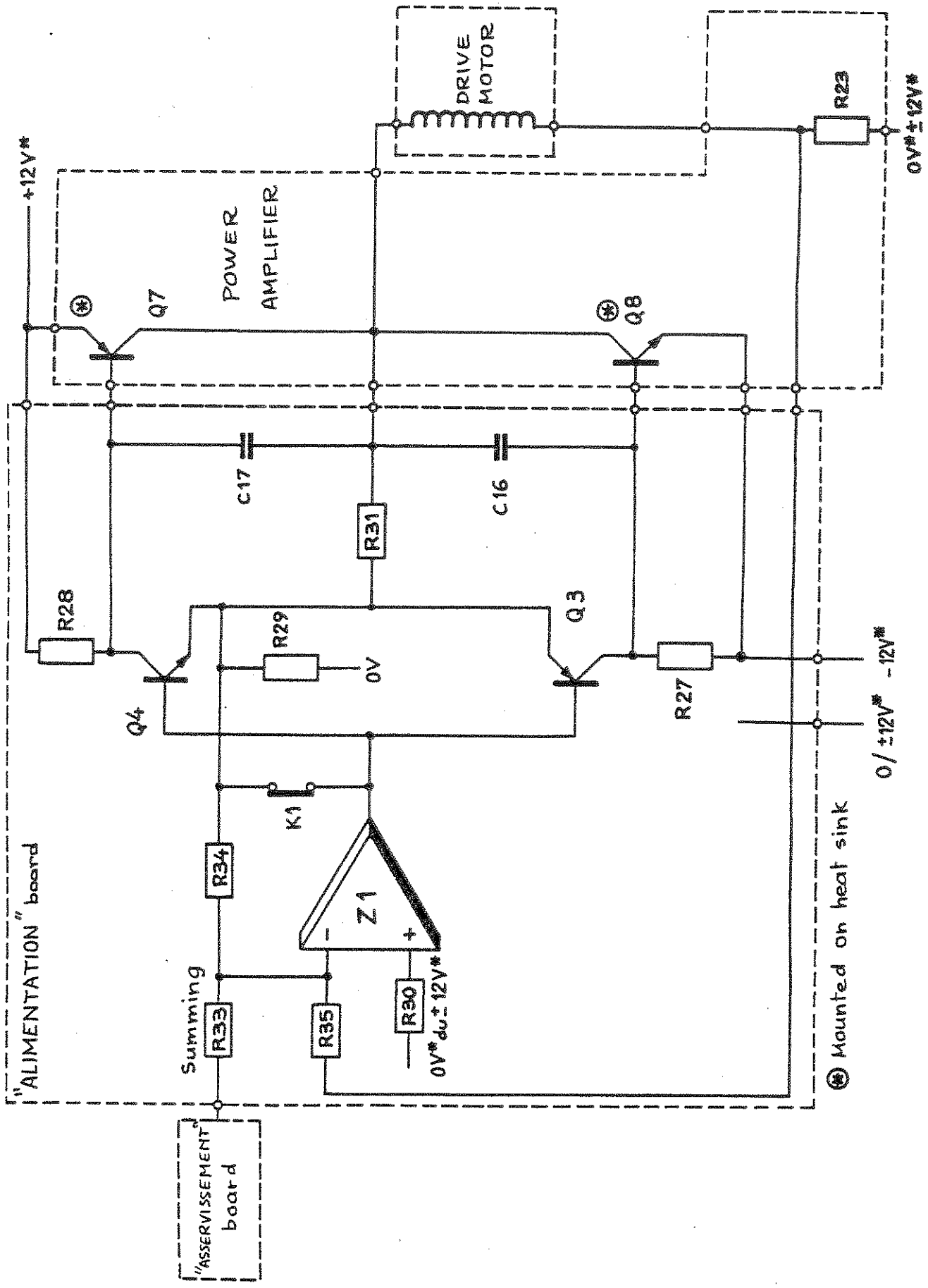
NOTE : When the carriage return is made from a position of less than 32 characters, the first stage is suppressed.

- out-of-position servo-control : this operating mode is a complementary safety feature for position servo-control. Beyond the tolerance of + 3 columns of position servo-control, the carriage undergoes an out-of-position digital servo-control limited to + 28 columns (one character). Beyond this value, the microprocessor orders a change to the speed servo-control mode, carriage return to the mechanical limit and then advance to search for the beginning of line.

Summing, performed in order to obtain the "Summing" error signal controlling the DRIVE MOTOR, is based on the summing obtained during position servo-control. At the + 3 column threshold, the switch (Y5-16) opens disconnecting the "Pos" signal. The analog "Rating" voltage increases in proportion to the number of shift columns, thus tends to bring the carriage back to its theoretical balance position.

The derivative signal of "Pos", still summed with the analog "Rating" voltage in the out-of-position servo-control mode, has no influence on summing since the movement of the carriage is relatively slow.





Drive motor amplifier

5.2.8 DRIVE MOTOR amplifier

("ALIMENTATION" board and POWER AMPLIFIER)

The DRIVE MOTOR amplifier on the "ALIMENTATION" board receives the "Summing" signal from the "ASSERVISSEMENT" board. The signal drives the operational amplifier (Z1) which, depending on whether the signal is positive or negative, controls the cascade of transistors (Q3–Q8) or (Q4–Q7) of the POWER AMPLIFIER located at the back of the unit.

Resistor (R23) generates a feedback voltage proportional to the current in the DRIVE MOTOR. The voltage is applied at the input of amplifier (Z1) via resistor (R35). The value ratios of resistors (R33–R34) and (R35–R34) determine the gain of amplifier (Z1) for each input signal, thus providing summing between the "Advance" order and its execution.

The power stage on the POWER AMPLIFIER is driven by two sources (+ 12 V*) (see NOTE) and (- 12 V*) of the ± 12 V* POWER SUPPLY.

The stages previous to these are located on the "ALIMENTATION" board.

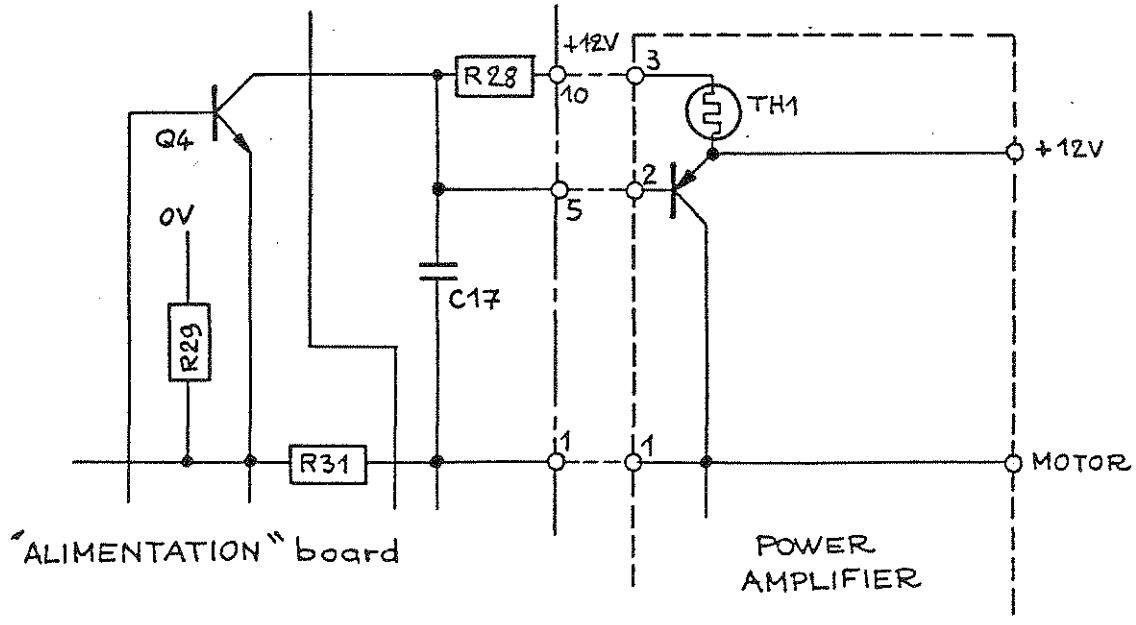
The gain of the output stage is determined by a pair of resistors (R29–R31) whereas the total gain of the amplifier is fixed by the resistors (R23–R33–R35).

The relay (K1) controlled by the initialization circuit blocks the DRIVE MOTOR amplifier during the initialization phase of the microprocessor and of the input-output circuits. The relay control mode is described in the "Initialization circuit" paragraph.

NOTE : The power supply sources assigned with the symbol * are "high current" sources.

Complementary data

A thermistor (TH1) ensures a protection from the short - circuits between 30 V* and 12 V*.



5.2.9 DRIVE MOTOR

The permanent magnet DRIVE MOTOR has the following characteristics :

- power supply voltage (u) : 12 V
- starting torque : 20 cm N
- torque per amp : 2.9 cm N/A
- electro-motive force : $3V/10^3$ r.p.m.
- maximum speed at nominal voltage : 3400 r.p.m.
- time constant at nominal voltage : 50 ms

5.3 LINE FEED

(LINE FEED MOTOR, PLATEN, PAPER ADVANCE, "PIA PERFO + AMPLI" and "PERSONNALISATION" boards)

The line feed device consists of a PLATEN controlled by a stepping motor through a reduction gear.

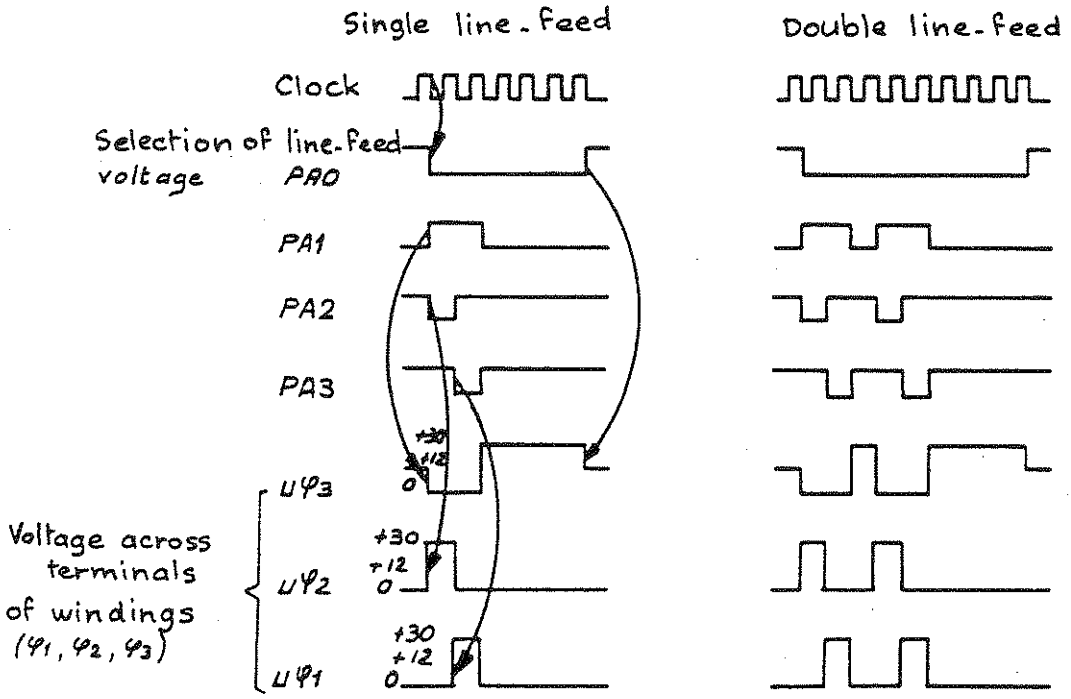
5.3.1. LINE FEED MOTOR

The stepping motor is a three-phase variable reluctance motor. During the line feed, the motor phases are supplied at 30 V. When the motor is stationary, to maintain sufficient torque, one phase remains energized at 12 V.

5.3.2 LINE FEED MOTOR input-output circuits

("PIA PERFO + AMPLI" and "PERSONNALISATION" boards)

The selection of single or double line feed is made on input (PA6) of input-output circuit (Z3) of the "PERSONNALISATION" board by means of switch (SW2).

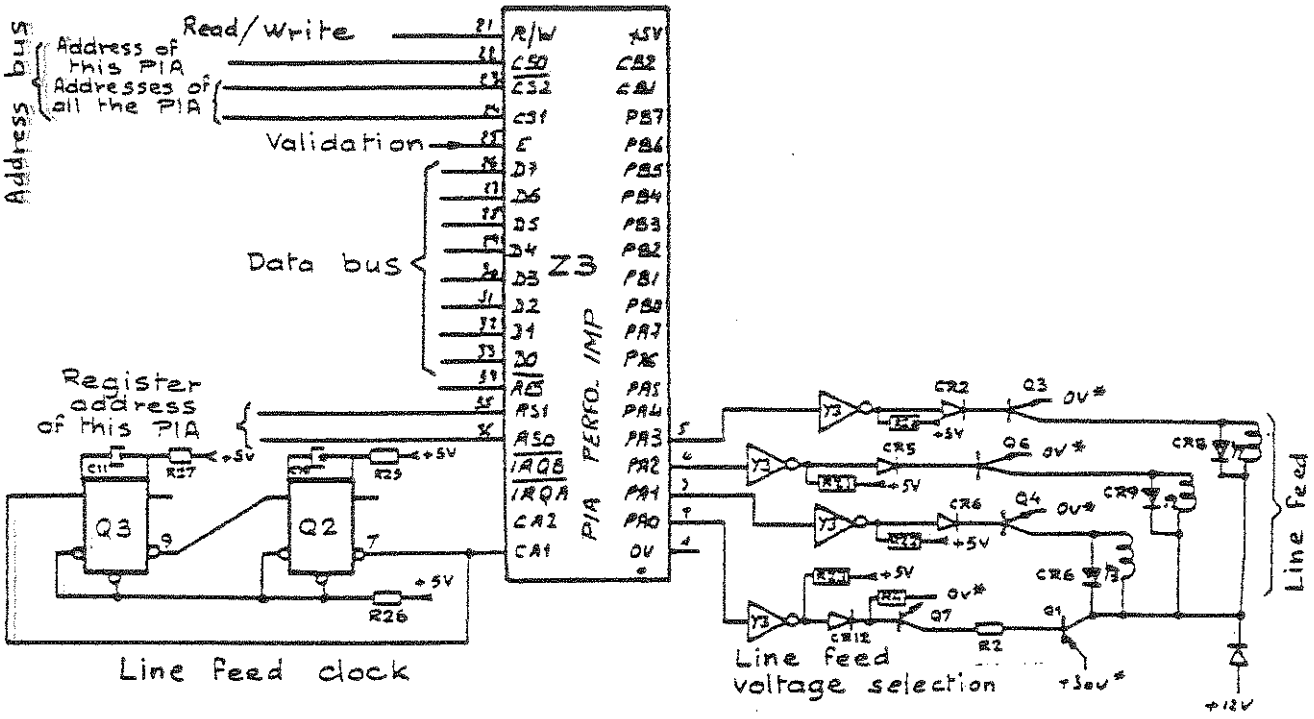


The three phases of the motor ($\varphi 1, \varphi 2, \varphi 3$) are controlled successively during one line feed clock period. After the line feed control, $\varphi 3$ still remains energized at 30 V for three clock periods in order to allow the LINE FEED MOTOR to become stabilized.

Clock period : t(Z4-9) + t(Z4-7) i.e. 560 s + 6.600ms = 7.16ms (typ.)

A circuit controlled by "line feed voltage selection", obtained from the output (PA0) of input-output circuit (Z3), allows + 30 V and + 12 V voltage switching.

In the event of a double line feed, following cycle $\varphi 1, \varphi 2$ and $\varphi 3$ of the first line feed, the three phases are controlled again during the same cycle. The stabilization time occurs after the second cycle.



Line feed input-output circuit

5.4 RIBBON DRIVE AND REVERSING SYSTEM

("PIA IMP", "PIA PERFO + AMPLI" boards, RIBBON ASSEMBLY (LEFT), RIBBON ASSEMBLY (RIGHT).

5.4.1 General

The ribbon advance and reversing system consists of :

- an input-output circuit generating the "Cde AV.RUB" (ribbon advance control) signal, located on the "PIA PERFO + AMPLI" board,
- an advance and reversing control circuit located on the "PIA IMP" board,
- a spool (N°1), mechanically connected to the shaft of a direct current motor (M1) and forming the RIBBON ASSEMBLY (LEFT),
- a spool (N°2), mechanically connected to the shaft of a direct current motor (M2) via an irreversible gear-wormscrew reduction arrangement, and an eyelet or ribbon tension detector, forming the RIBBON ASSEMBLY (RIGHT).

5.4.2 RIBBON ASSEMBLIES (LEFT AND RIGHT)

- Ribbon without eyelet

Motor (M1) is permanently connected to + 5 V*. Motor (M2) is energized during the time taken to return to beginning of line by the PRINTING DEVICE, with + 12 V* or with - 12 V* depending on the direction in which the ribbon is moving. The reversing control takes place as follows :

When spool n° 1 is empty and spool n° 2 full, the tension on the ribbon is increased because spool n° 2 tends to wind the ribbon in whereas its attachment to spool n° 2 prevents this from taking place.

This increase in tension causes the "Tension detector" lever controlling the reversal of direction to move.

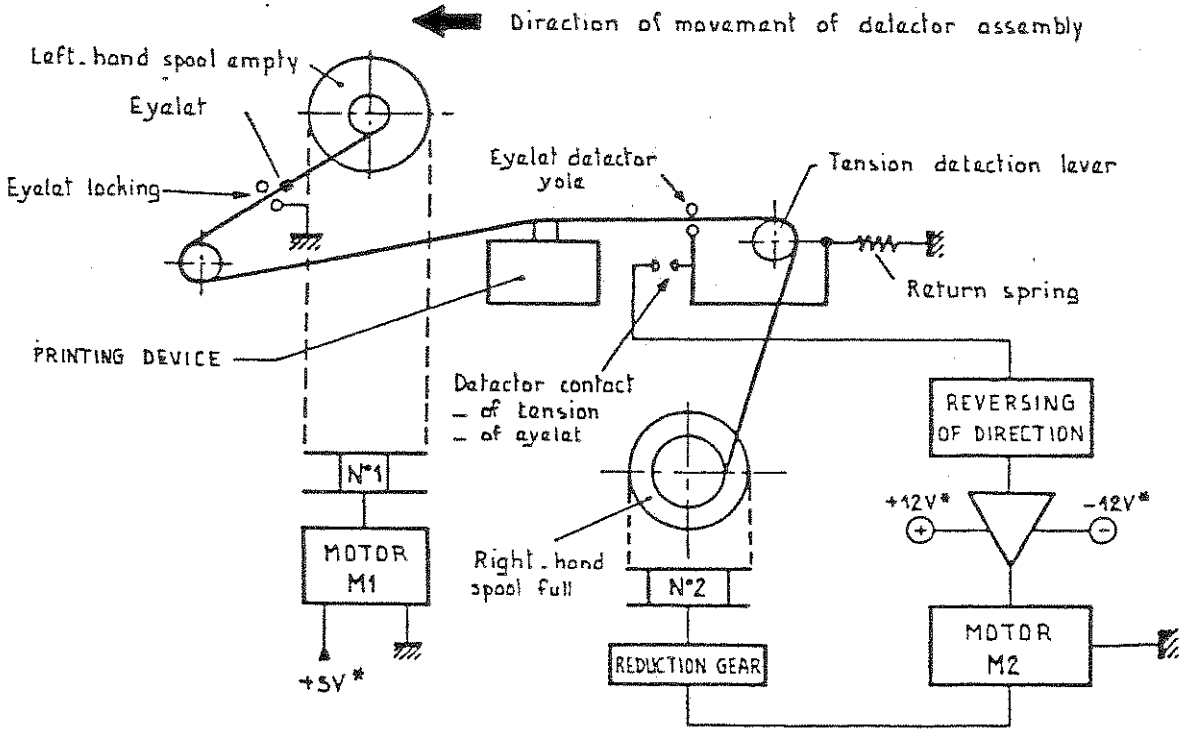
- Ribbon with eyelet

Here, operation is identical but the "tension detector" function of the lever is provided by the "Eyelet detector" lever when the eyelet locks into it.

5.4.3 System input-output circuit

On each carriage return, the input-output circuit ("PIA PERFO-IMP", (Z3) supplies the "Cde AV.RUB" (ribbon advance control) signal via output (CA2). The real time clock (see paragraph : MANAGEMENT OF TRANSMISSION PATH SUPERVISION DATA is also used as a time reference in order to obtain a 400 ms duration "Cde AV.RUB" signal.

NOTE : The power supply sources assigned with the symbol * are "high current" sources.



RIBBON DRIVE AND REVERSING SYSTEM

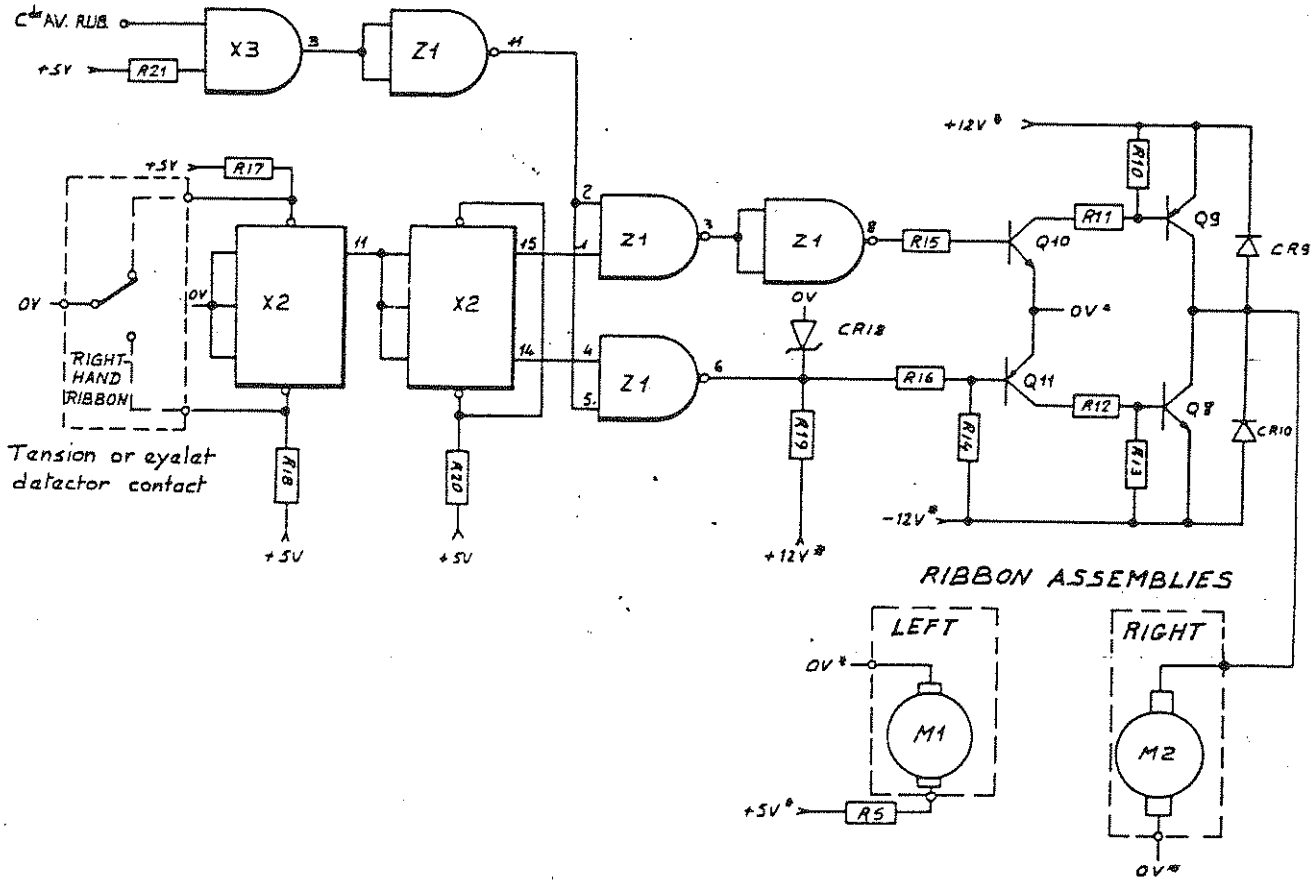
5.4.4 Advance and reversing controls (plate 5-1)

The "Cde AV.RUB" (ribbon advance control) signal is applied to one input of AND gate (X3-3) the other input of which is held at level "1" through resistor (R21). The output is inverted by NAND gate (Z1-11) which drives NAND gates (Z1-3) and (Z1-6).

Flip-flop (X2-11) eliminates any bounce which occurs on the closing of the eyelet or tension detector contact. The storage of the state of reversal is ensured by flip-flop (X2-14 and 15).

When output (15) of flip-flop (X2) is set to logic level "1" and when there is a ribbon advance control present, the transistor (Q10) becomes saturated thus causing the saturation of transistor (Q9) through the resistor bridge (R10 and R11) ; motor (M2) then turns clockwise. When output (15) of flip-flop (X2) is at logic level "0", a logic "1" is applied to input "4" of the NAND logic gate (Z1) ; operation is identical to that described above ; the saturation of transistor (Q8) makes motor (M2) turn counter-clokwise. When there is no ribbon advance control, transistors (Q8 and Q9) are blocked while motor (M2) is off.

The bridge consisting of resistor (R19) and diode (CR18) prevents (Q11) from being saturated when the mains voltage is cut off.



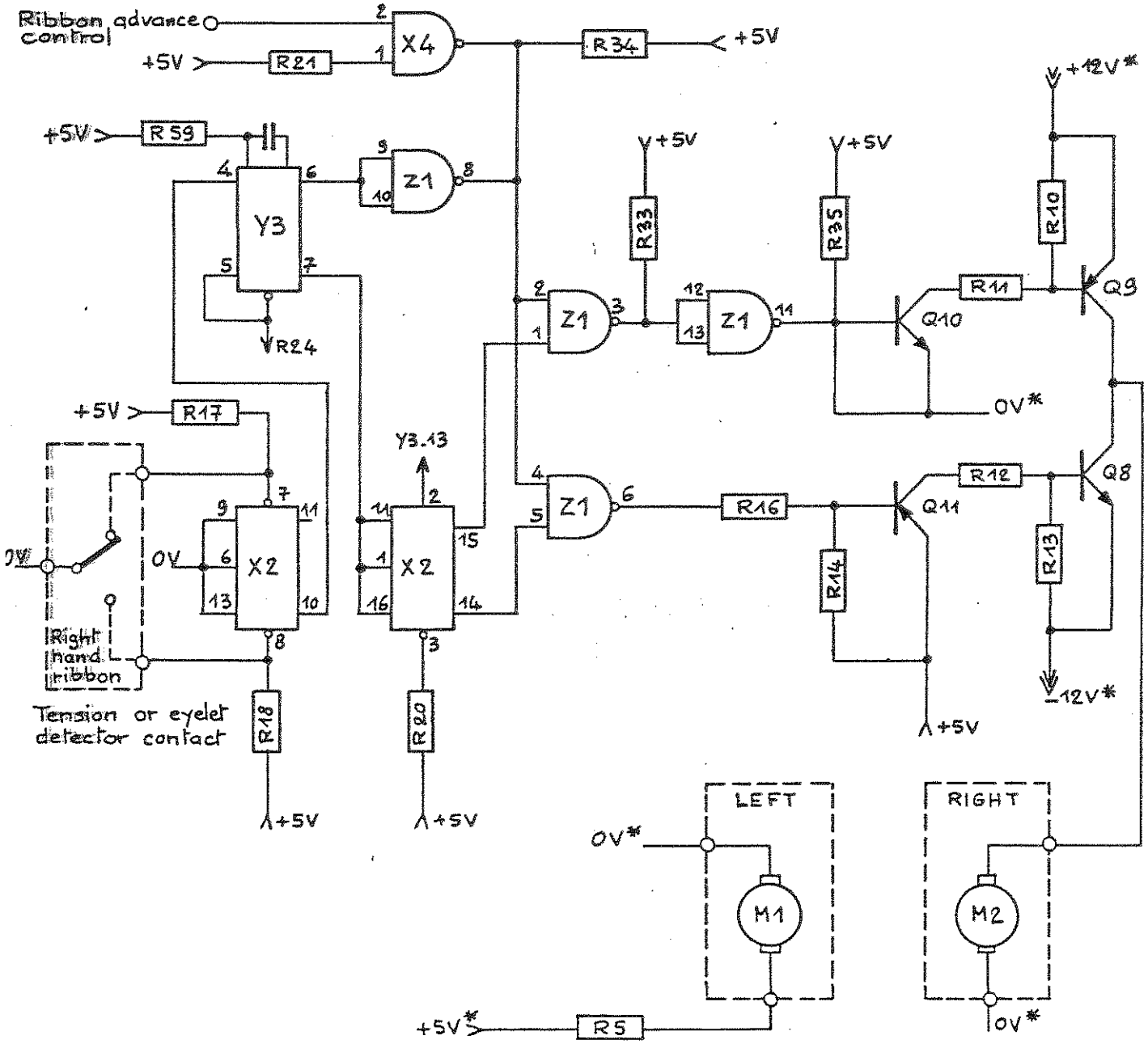
Advance and reversing controls

5.4.5 Complementary data

Ribbon advance controls (Plate 5-2)

The «Cde AV.RUB» (ribbon advance control) signal is applied to one input of NAND gate (X4-2) the other input of which is held at level «1» through resistor (R21). The control pulse proceeding from (X4-3) drives inputs «2» and «4» of (Z1).

Flip-flop (X2-10) eliminates any bounce which occurs on the closing of the eyelet or tension detector contact. The storage of the state of reversal is ensured by flip-flop (X2-14 and 15) and is applied to inputs «1» and «5» of (Z1). The monostable (Y3-7) controls flip-flop (X2). Every time that the ribbon reversing control is activated, monostable (Y3-6) inhibits the control pulse proceeding from (X4-3). This arrangement forbids every possibility of simultaneous conduction of power transistors (Q8) and (Q9), supplied with opposite voltages. These circuits are protected by thermistors (TH1) on + 12 V input, and (TH2) on - 12 V input.



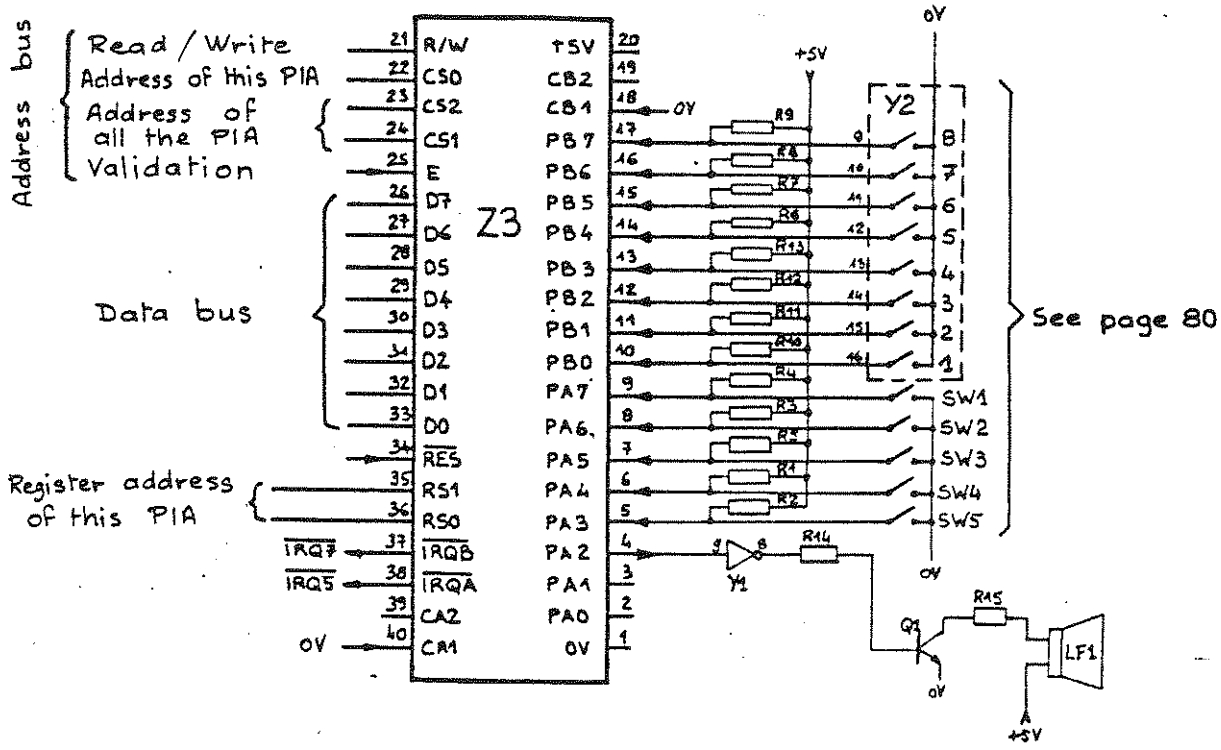
ADVANCE AND REVERSING CONTROLS

6 – PERSONALIZATION
(«PERSONNALISATION» board)

This board is equipped with all the controls allowing the equipment operation selection.

These controls are provided by switches (SW1 to SW5), accessible to the operator, and by D.I.L. switch (Y2) which is accessible to the maintenance technician. The switches set a logic "1" or logic "0" on inputs (PA3 to PA7 and PB0 to PB7) of the input-output circuit (Z3). The setting to "1" of the inputs (PA3 to PA7 and PB0 to PB7) is accomplished by aplying a power supply + 5 V via the resistors (R1 to R13).

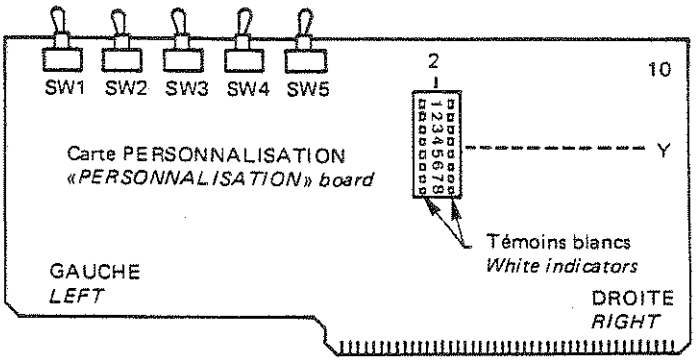
The audible alarm (FL1) is controlled through resistor (R15) by the saturation of transistor (Q1) caused by the application of a logic "0" to the input of inverter (Y1).



SWITCH SETTINGS OF THE "PERSONNALISATION" BOARD

INTERRUPTEURS ACCESSIBLES A L'OPERATEUR *SWITCHES WITHIN THE REACH OF THE OPERATOR*			
INTERRUPTEUR *SWITCH*	FONCTION *FUNCTION*	LEVIER A GAUCHE *TOGGLE TO LEFT*	LEVIER A DROITE *TOGGLE TO RIGHT*
SW 1	Etat du PERFORATEUR lors de la réception d'un appel *State of TAPE PUNCH when receipt of an incoming call*	Mis en marche *ON*	Mis à l'arrêt *OFF*
SW 2	Interligne *Line feed*	Simple *Single*	Double *Double*
SW 3	Dégagement du texte *Text visibility*	Après 250 ms *After 250 ms*	Après 750 ms *After 750 ms*
SW 4			
SW 5	Nombre d'interlignes en fin de communication *Line feed number at the end of communication*	8	4

INTERRUPTEURS ACCESSIBLES A L'INSTALLATEUR OU A L'AGENT DE MAINTENANCE *SWITCHES WITHIN THE REACH OF THE FITTER OR MAINTENANCE PERSONNEL*			
INTERRUPTEURS *SWITCHES* *Y2*	FONCTION *FUNCTION*	TEMOIN BLANC APPARENT A GAUCHE *WHITE INDICATOR VISIBLE ON THE LEFT*	TEMOIN BLANC APPARENT A DROITE *WHITE INDICATOR VISIBLE ON THE RIGHT*
1	Communication *Communication*	SIMPLEX *Simplex*	DUPLEX *Duplex*
2	Possibilité d'exploitation qu'après échange d'indicatif à l'établissement de la communication *Operating possibility only after exchange of answer-back codes when the communication in through*	Inoperant *Inoperative*	Operant *Operative*
3	Alarm sonore (défaut) *Sound alarm (fault)*	Permanente *Permanent*	Fugitive *Momentary*
4	Déclenchement de l'émetteur d'indicatif par la séquence de signaux «CHIFFRES» «D» *Trigger of the answer-back unit by the sequence of «FIGURES» «D» signals*	Impossible *Impossible*	Possible *Possible*
5			
6	Perforation de «CHIFFRES» «D» *Punching of «FIGURES» «D»*	Sans *Without*	Avec *With*
7			
8	Transmission *Transmission*	Simple courant passif *Single current passive*	Double courant ou simple courant actif *Double current or single current active*



NOTA : Le changement de position des interrupteurs (Y2) s'effectue par appui sur les témoins blancs.

NOTE : Position change of switches (Y2) is carried out by depressing white indicators.

7 – TAPE PUNCHING
(TAPE PUNCH, «PIA PERFO + AMPLI» board)

7.1 GENERAL

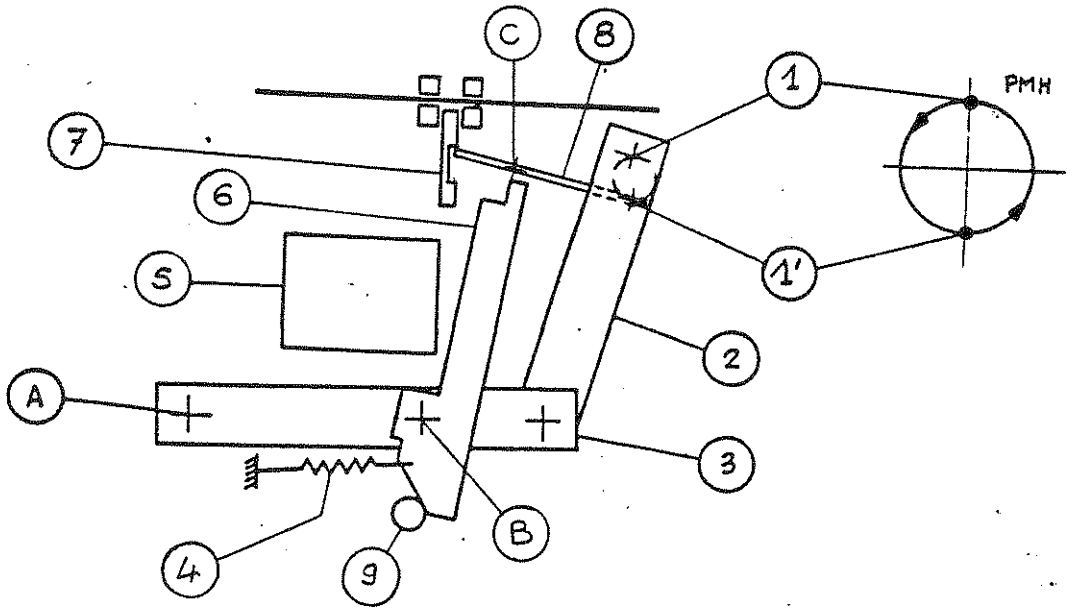
The TAPE PUNCH is equipped with a ferro-magnetic sensor mounted on an excentric, defining the feed and punch sequence from a mechanical origin (upper neutral point "PMH").

Back spacing of the punched tape is obtained by means of a pawl integral with the BACK-SPACER key. The pawl meshes directly with the ratchet wheel of the feed control in order to make one back spacing step.

7.2 PUNCHING DEVICE

One revolution of the eccentrics represents on punch step. The position of the mechanical parts is represented according to the position of the eccentrics. Rod (2) is coupled to eccentric (1) and to rod (3), the pivoting point (A) of which is fixed.

The armature (6) of electromagnet (5) pivots on shaft (B) of rod (3) and bears against stop (9) under the effect of spring (4).



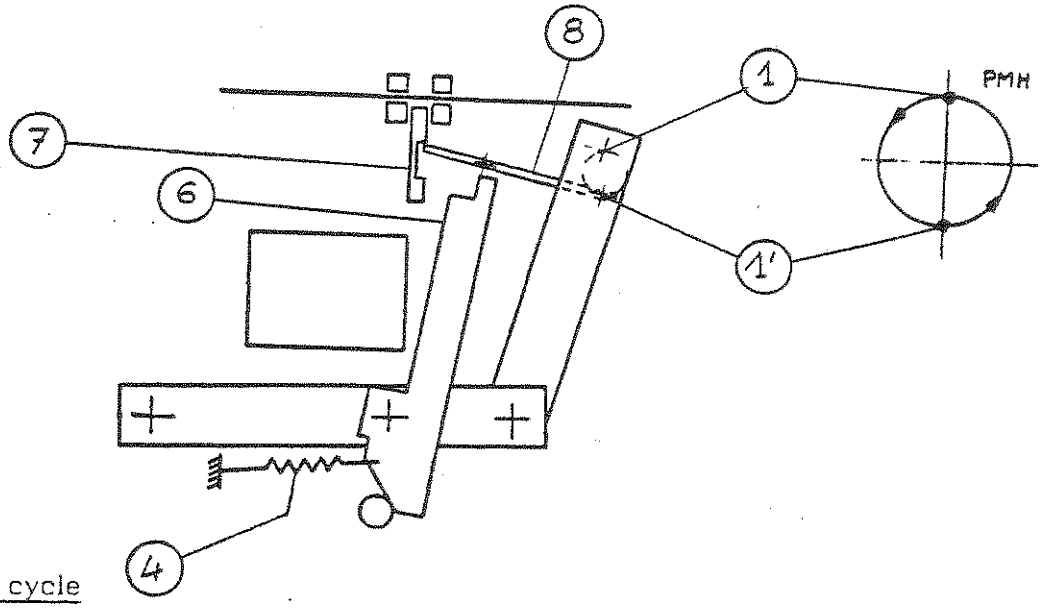
Return lever (8) of punch (7) pivots on shaft (C) ; it is actuated by eccentric (1'), diametrically opposed to eccentric (1).

7.2.1 Cycles with punching

Start of 1st cycle

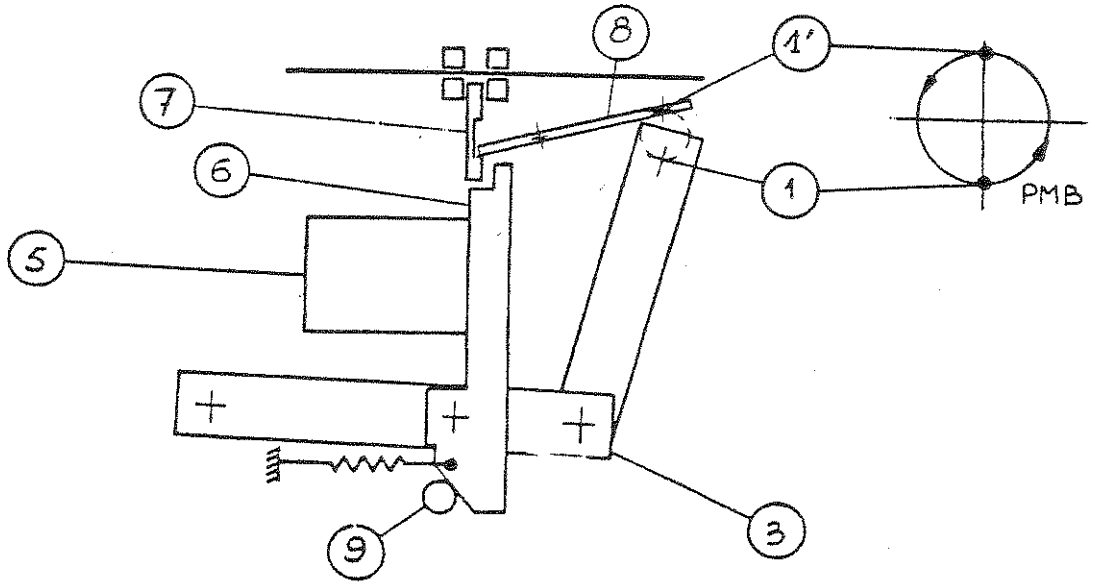
The mechanical parts are in the following configuration :

- eccentric (1) is in the high position,
- eccentric (1') is in the low position,
- lever (8) is in the high position in the groove of punch (7),
- armature (6) clears the end of punch (7) under the effect of spring (4).



Middle of 1st cycle

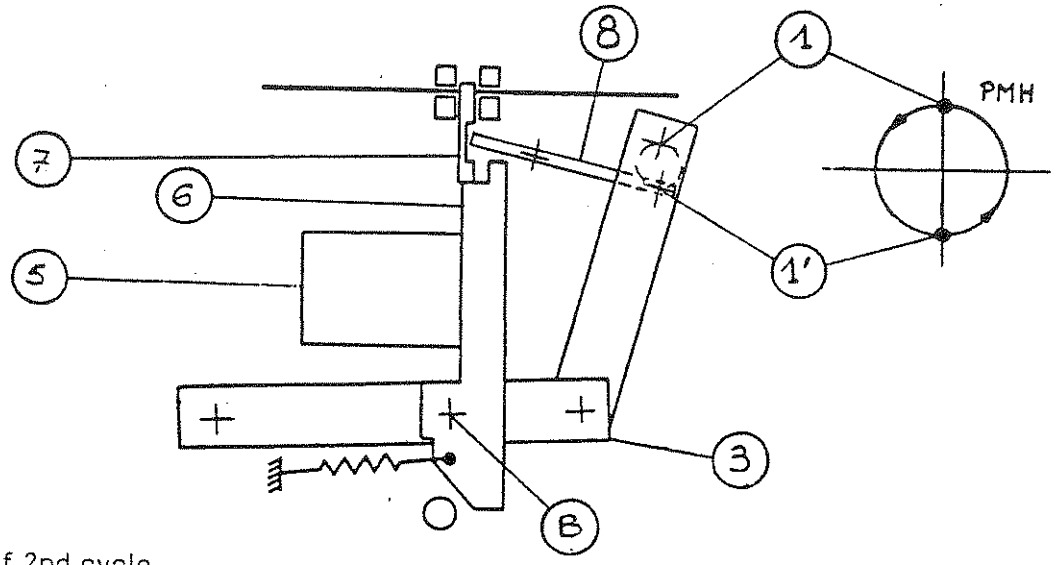
- eccentric (1) is in the low position while eccentric (1') is in the high position,
- lever (8) bears against the bottom part of the groove of punch (7),
- armature (6) bears against electromagnet (5) under the effect of rod (3) and stop (9).



The electromagnet (5) is energized at the moment of control generated by the electronic logic associated with the TAPE PUNCH ("PIA PERFO + AMPLI" board).

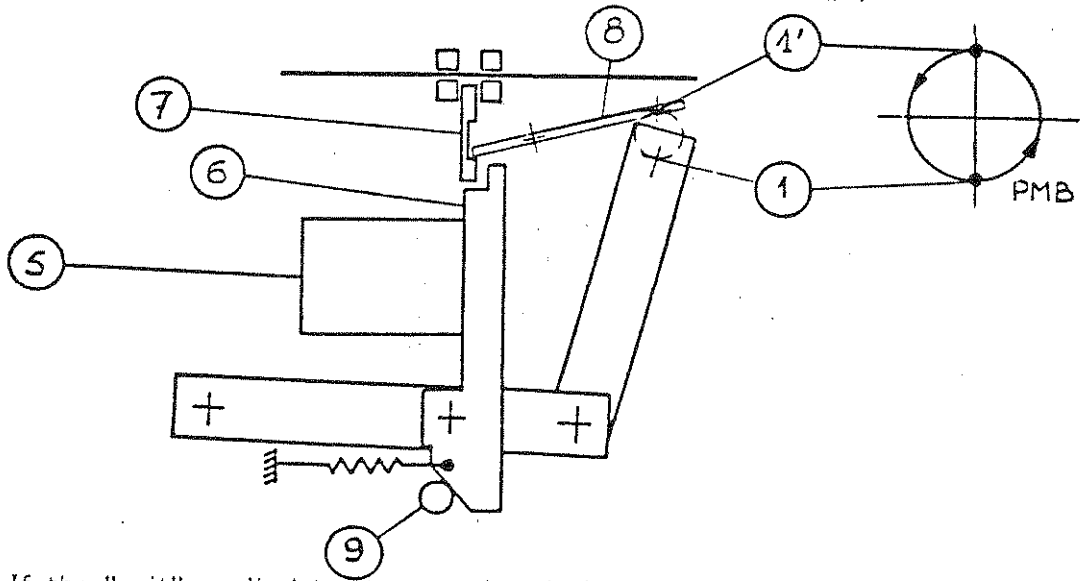
End of 1st cycle and stard of 2nd cycle

- eccentric (1) is in the high position,
- eccentric (1') is in the low position,
- being retained by electromagnet (5), armature (6) drives punch (7) to move upwards as it is fastened at (B) to rod (3)
- lever (8) is lifted into the groove of punch (7) under the effect of eccentric (1') in order to allow the punch to rise.



Middle of 2nd cycle

- eccentric (1) is in the low position
- eccentric (1') is in the high position,
- armature (6), still retained by electromagnet (5), returns to bear against stop (9),
- lever (8) pulls punch (7) downwards under the effect of eccentric (1').



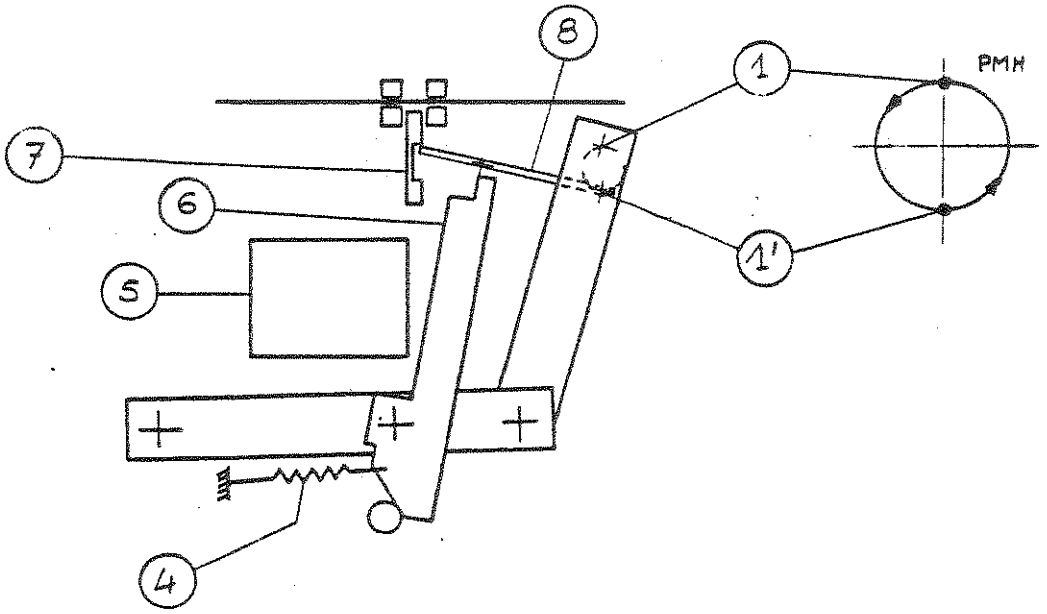
If the "unit" applied to the associated electronic logic requires further punching operations, the electromagnet will remain energized up to the middle of the 3rd cycle ; otherwise, the electronic logic cuts off the power supply and operation is resumed at the beginning of the 1st cycle.

7.2.2 Cycles without punching

Start of 1st cycle

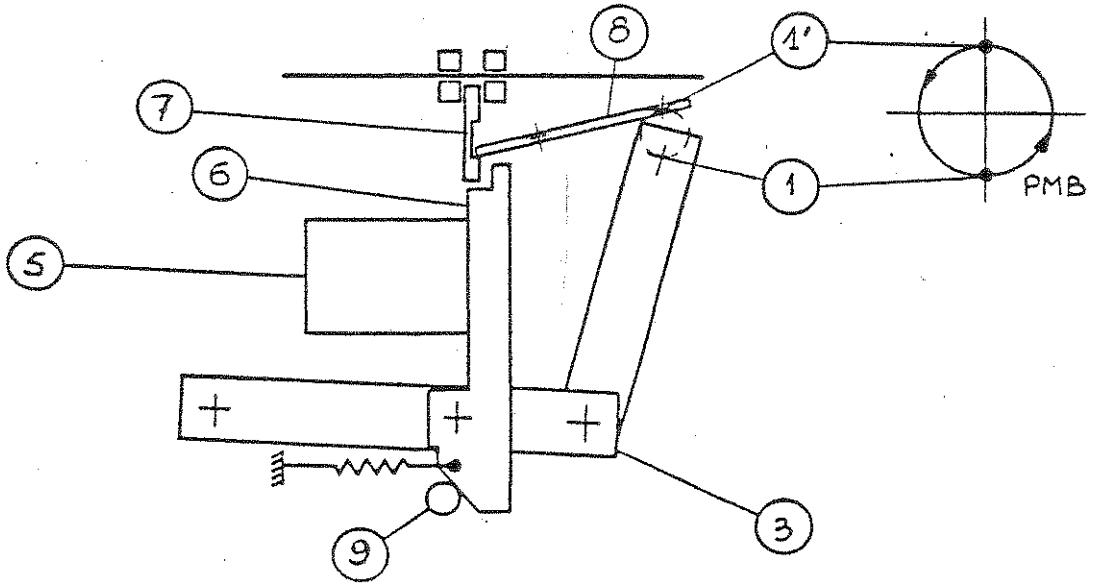
The mechanical parts are in the following configuration :

- eccentric (1) is in the high position,
- eccentric (1') is in the low position,
- lever (8) is in the high position in the groove of punch (7),
- armature (6) clears the bottom of punch (7) under the effect of spring (4).



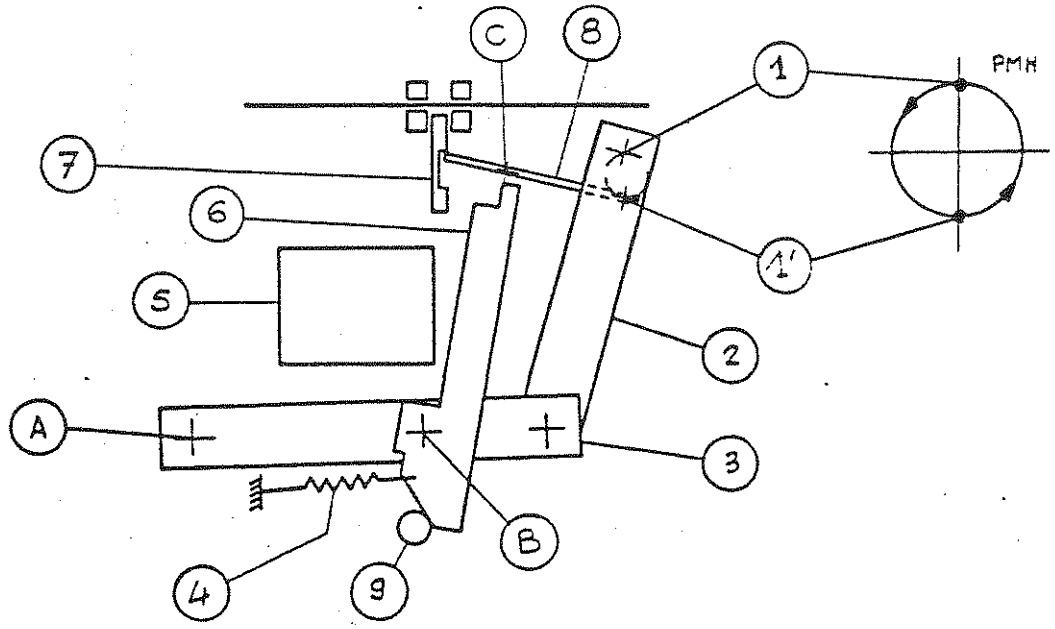
Middle of 1st cycle

- eccentric (1) is in the low position,
- eccentric (1') is in the high position,
- lever (8) bears against the lower part of the groove of punch (7),
- armature (6) bears against the electromagnet (5) under the effect of rod (3) and stop (9).



End of 1st cycle and start of 2nd cycle

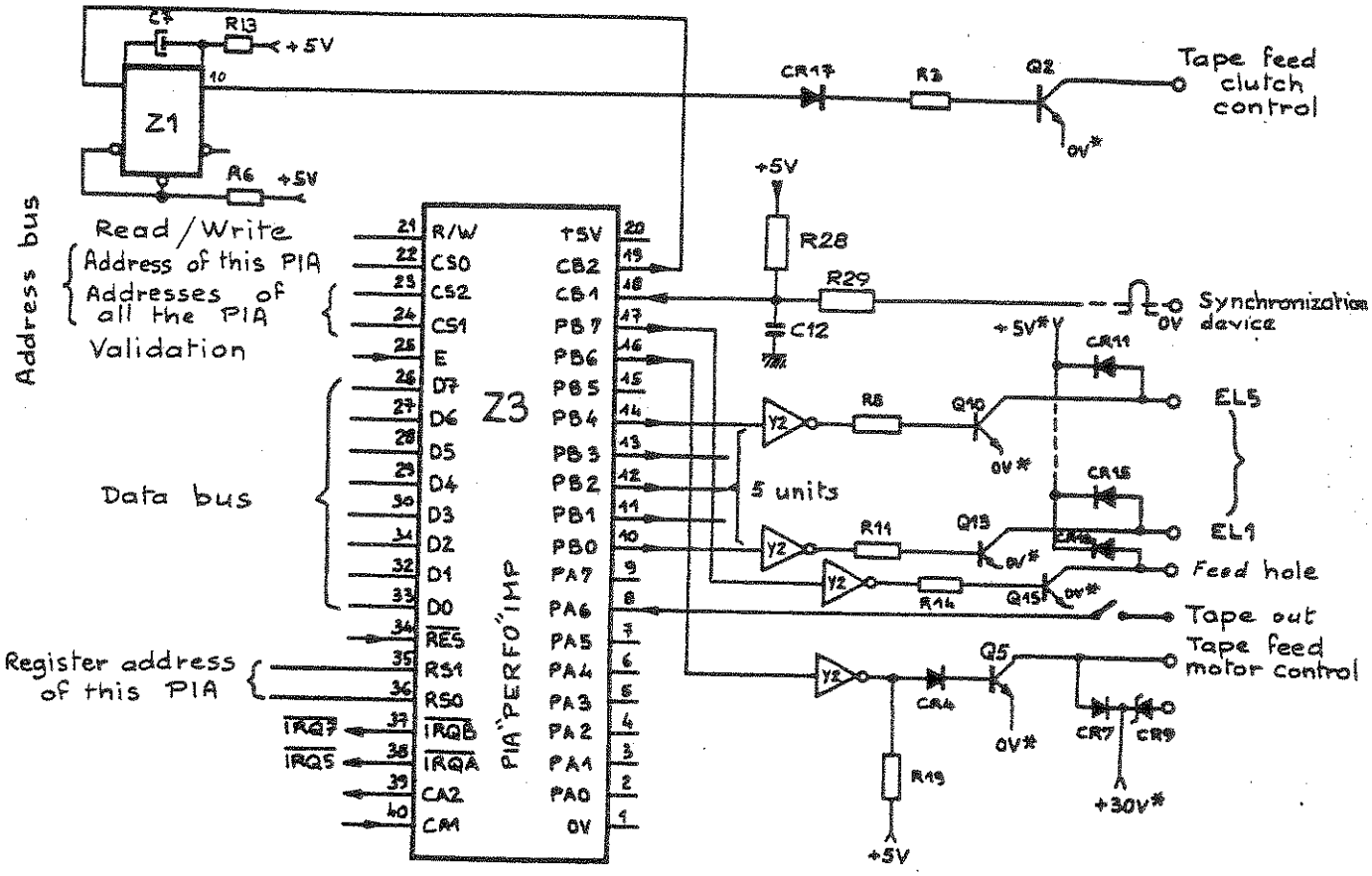
- eccentric (1) is in the high position,
- eccentric (1') is in the low position,
- lever (8) is in the high position in the groove of punch (7),
- armature (6) clears the bottom of punch (7) under the effect of spring (4).



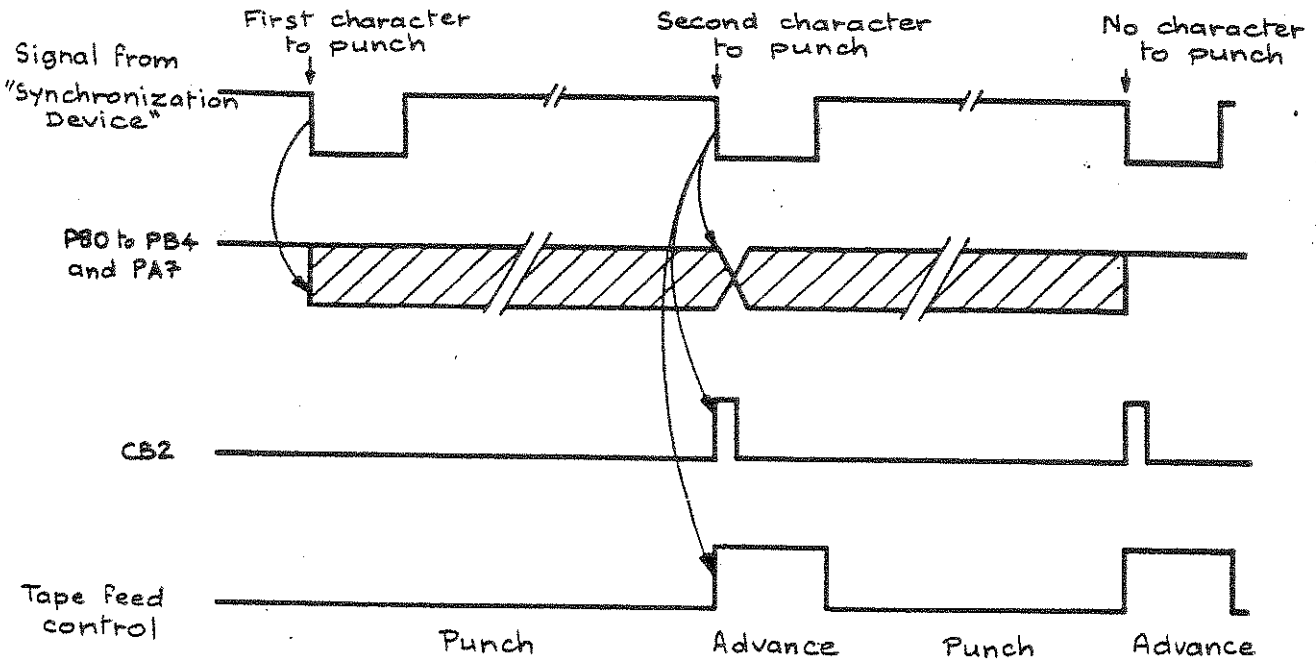
In fact, because electromagnet (5) is not energized, armature (6) is not held against it.

Armature (6) returns gradually to the idle position because it bears against stop (9).

If the "unit" applied to the associated electronic logic requires the punching of a hole, the device will behave as described in the 1st and 2nd cycles with punching, otherwise the middle and end of the 2nd cycle in progress will be identical to those of the 1st cycle without punching.



TAPE PUNCH input-output circuit



Timing diagram of tape feed control

7.3 TAPE PUNCH INPUT-OUPUT CIRCUIT

("PIA PERFO + AMPLI" board)

General

The D-C motor drives a pulley via a belt. The signal used as reference to the mechanics and the electronics of the equipment is provided from a device consisting of :

- soft-iron core integral with the pulley,
- magnet coil,
- processing electronical circuit.

The motor also supplies the energy required for punching the 5-units and the feed hole. The "unit" and feed hole electromagnets are used only for controlling the punches.

The advance control electromagnet releases a ratchet wheel notch by notch used for feeding the punched tape.

Operation of control electronic

The selection of the TAPE PUNCH applies a logic level "0" to (PB6) of the "PIA PERFO + IMP" input-output circuit (Z3). Through inverter (Y2), transistor (Q5) becomes conductive and energizes the motor.

The TAPE PUNCH applies the signals obtained from the "Synchronization device" to the input (CB1) of PIA. The punch and feed hole electromagnets, selected by outputs (PB0 to PB4 and PB7) of the input-output circuit (Z3) are supplied with + 5 V.

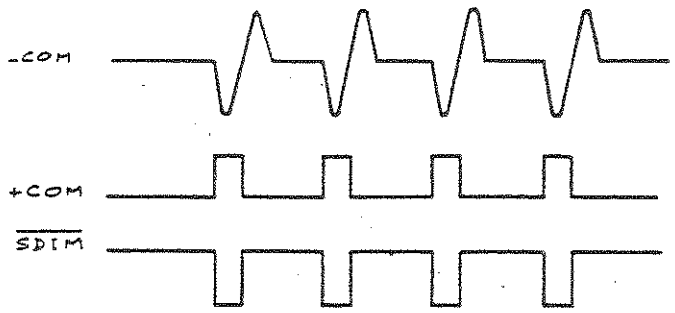
The RC filter (R29-C12) suppresses any interference present while resistor (R28) sets a logic level "1" at the input of the PIA.

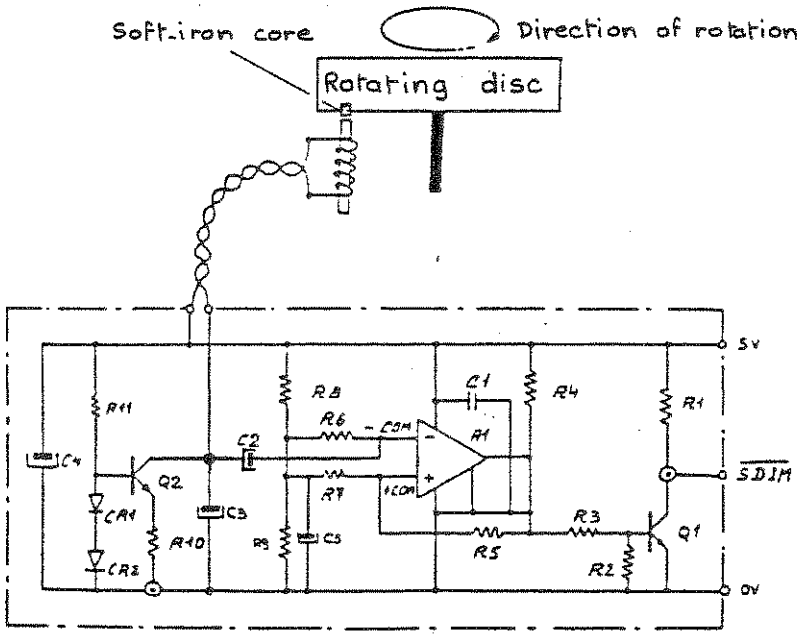
To allow the last punched code to be read before tape feed occurs, monostable (Z1) applies a tape feed control pulse. The monostable is triggered by output (CB2) of PIA if there is a signal present, coming from the "Synchronization device", and if a character was punched during the preceding cycle. (Z1) pulse duration : 3.3 ms (adjusted).

A control switch detects the end of the tape by applying a logic "0" to input (PA6) of (Z3).

7.4 SYNCHRONIZATION DEVICE (TAPE PUNCH)

The magnetic flux of coil carrying an electric direct current varies each time the soft-iron core passes. This results in potential fluctuation at the terminals of capacitor (C3) charged and discharged at constant current through transistor (Q2) connected as a constant current generator. The potential fluctuation at capacitor terminals (C3) is applied on"-COM"input of the operational amplifier (A1) connected as Schmitt trigger through deviator circuit (R6, R8, C2). The resulting signal is then inverted through transistor (Q1).





8 – ABBREVIATED NUMBERING («NUMEROTATION ABREGEE» board)

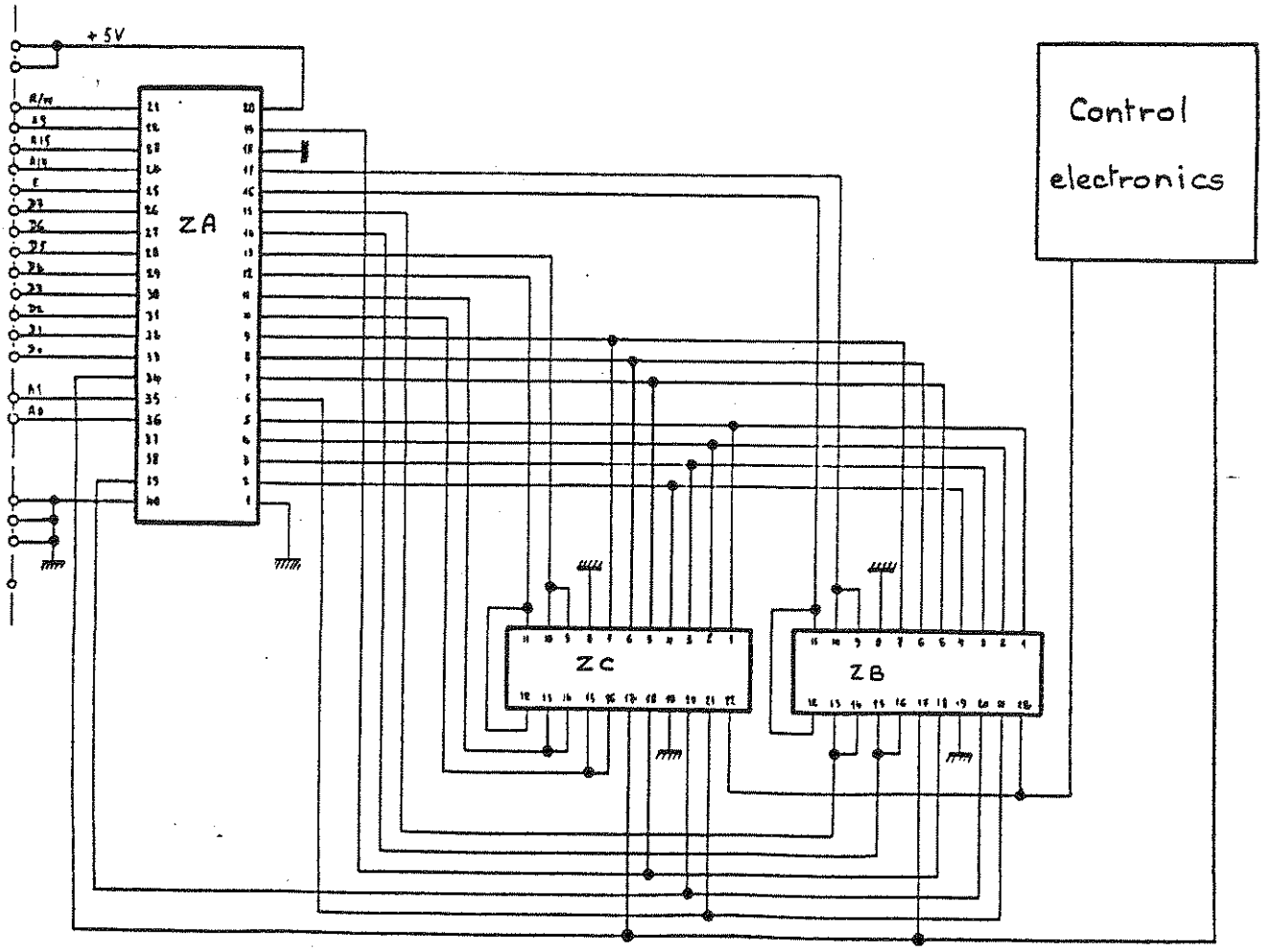
8.1 GENERAL

The "NUMEROTATION ABREGEE" board consists of :

- an input-output circuit (ZA),
- two working memories (ZB and ZC) in which the 10 subscriber numerals are stored,
- an electronic circuit ensuring the following functions :
  - power supply of memories (ZB and ZC) when the power fails or is switched off,
  - initialization on switching on,
  - charging of the accumulator (BT1 and BT2).

8.2 INPUT-OUTPUT CIRCUIT AND MEMORIES

The initialization of the input-output circuit (ZA) at (ZA-34) , the enabling "CE2" (ZB-17 and ZC-17) and the power supply (ZB-22 and ZC-22) for the memories, are ensured by the controls electronics.

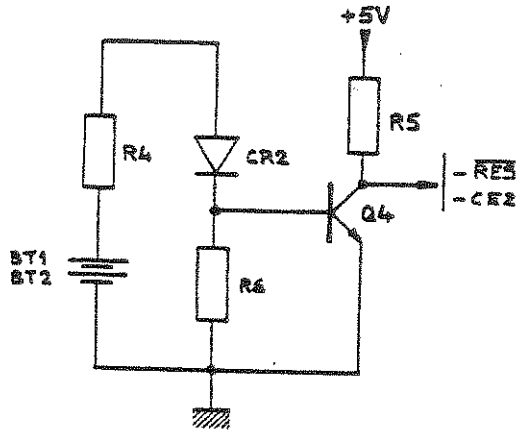


8.3 CONTROL ELECTRONICS

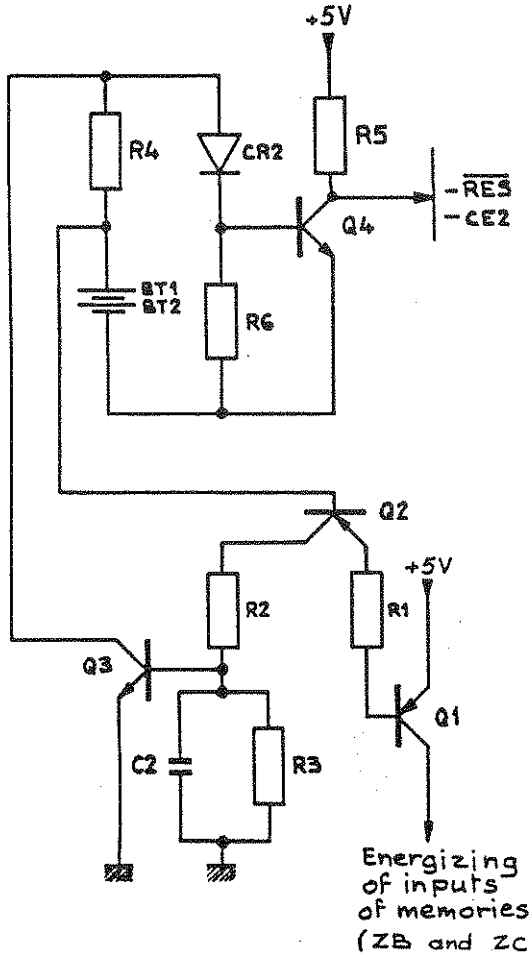
8.3.1 Power supply of memories with unit switched off

In order to preserve the subscriber numerals in the memories, (ZB and ZC) are permanently energized. When the unit is not switched on, the accumulator (BT1 and BT2) energizes the memories (ZB and ZC) via diode (CR1).

8.3.2 Initialization on turning on



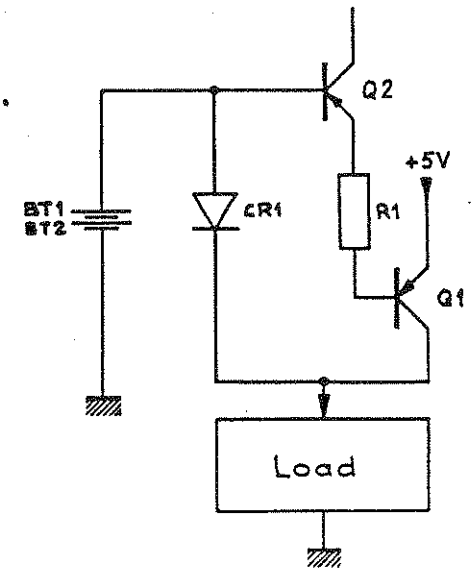
1) Accumulator (BT1 and BT2), through resistors (R4 and R6) and diode (CR2), saturates transistor (Q4) thus causing switching to state "0" on the inputs ($\overline{RES}$) on the input-output circuit (ZA) and (CE2) of memories (ZB and ZC).



2) The + 5 V voltage is established on the emitter of transistor (Q1). Therefore, (Q1) as well as (Q2) become slightly conductive. Capacitor (C2) is thus charged according to the time constant (R2C2) until transistor (Q2) conducts, applying a level "0" to the anode of diode (CR2). Transistor (Q4) becomes blocked thus applying + 5 V to inputs ($\overline{RES}$) of (ZA) and (CE2) of (ZB and ZC) through resistor (R5).

8.3.3 Accumulator charge circuit and + 5 V power supply of the memories

Once initialization is over, transistors (Q1 and Q2) are conducting. Diode (CR1) becomes blocked and the load is supplied by the + 5 V coming from transistor (Q1). Transistor (Q2) charges the accumulator (BT1 and BT2).

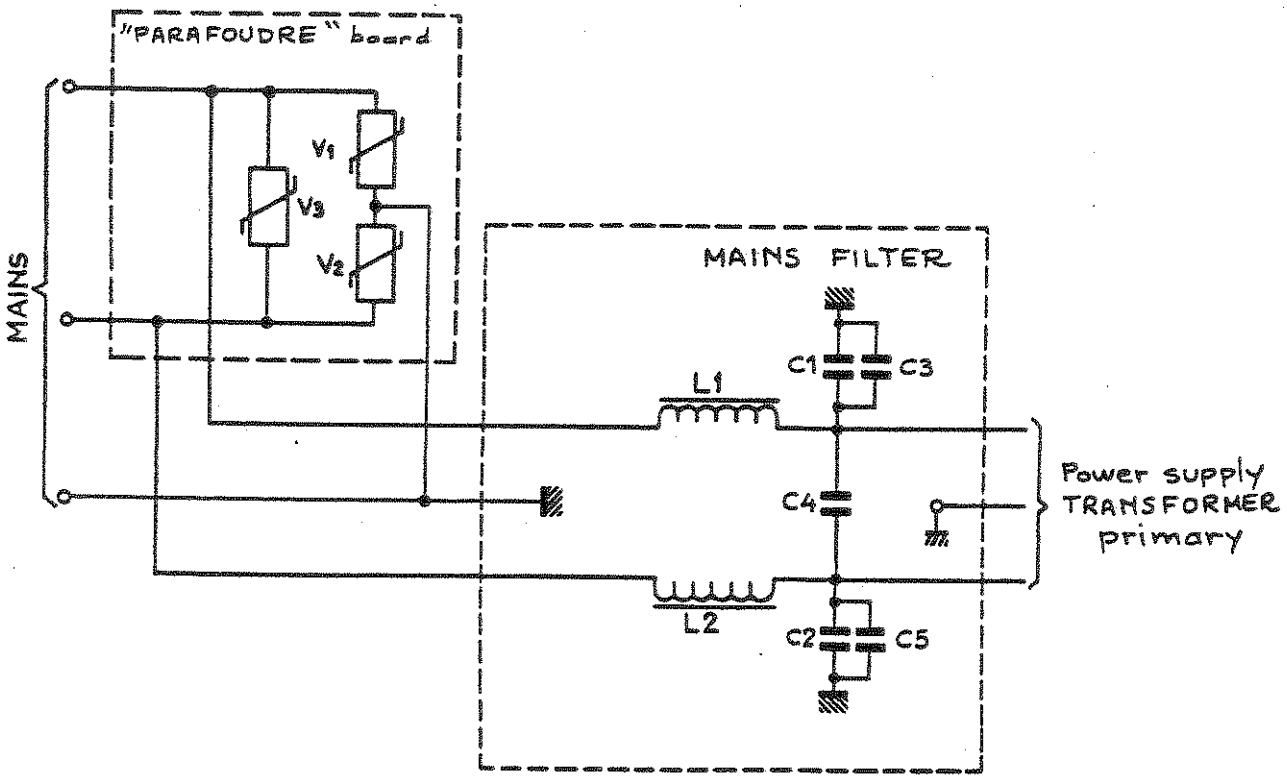


9 – POWER SUPPLY
(TRANSFORMER POWER AMPLIFIER 12 V POWER SUPPLY, «ALIMENTATION» and «RAM RPROM» boards)

9.1 MAINS FILTER AND LIGHTNING ARRESTOR "PARAFOUDRE"

The unit has a MAINS FILTER consisting of capacitors (C1 to C5), coils (L1 and L2).

The "PARAFOUDRE" board consists of the three resistors (VDR), the value of which varies according to the voltage applied across their terminals (V1 to V3). They protect the unit against possible overvoltages.



2

MAINTENANCE MANUAL

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LIST OF TOOLS

Description	Part number
STANDARD TOOLS (MECHANICS)	
- Screwdriver, Allen, 2.5 mm across flats	
- Screwdriver, watchmaker's, 3 blades	
- Allen Key, angle, 2.5 mm across flats	
- Socket wrench, 2.5 mm	
- Socket wrench, 5.5 mm	
- Socket wrench, 7 mm	
- Open-end wrench, 5 mm	
- Open-end wrench, 5.5 mm	
- Flat nosed pliers	
- Tweezers	
- Double spring hook	
- Set of shims	
- Oiler	
STANDARD TOOLS (ELECTRONICS)	
- Dual-trace oscilloscope	
- D.C. power supplies 5 V, 15 V, 24 V, 30 V.	
SPECIFIC TOOLS (ELECTRONICS)	
- 5-unit code rule	
- Portable maintenance equipment EMP2	
- Portable maintenance equipment EMP3	
- Tape punch cable	27 356 416-4
- Extender boards :	
. "ALIMENTATION"	23 101 935-8
. "ASSERVISSEMENT" and "PIA IMP"	23 101 931-6
. "PIA ERD + IT.ADA" and "PIA LECTEUR + AMPLI" and "PIA PERFO + AMPLI" and "PERSONNALISATION"	23 101 921-2
. "PIA CLAVIER + MPU" and RAM + RPROM" and "NUMEROTATION ABREGEE"	23 101 927-5
. "ADAPTATION"	23 101 942-3
SPECIFIC TOOLS (MECHANICS)	
- Contact extractor (MOLEX PRODUCTS CORP.)	HT 2285
- Pliers for installing and removing 4mm lock rings (GRIP RING)	
- Rod, 1.8 $\pm$ 0.02 mm diam (2 pieces)	
- Spring-balance, 0 to 4 N strength	

LIST OF TOOLS (Contd.)

- Gauges :		
. Sprocket wheel/feelers alignment and tape lid position, sprocket wheel and feelers protrusion		23 106 759-9
. Punch travel adjustment, and punch setting lever return shaft adjustment		27 356 345-6
. Lower neutral point		27 338 119-3
. Tape presser/sprocket wheel clearance (mylar tape)		27 356 417-2
. Synchronization (rod 4mm diam, 60mm length)		27 356 418-5
. Punch pitch		27 338 121-3
. Pressure rollers		23 106 762-7
. Ribbon assembly (left)	- Initial position - Shaft adjustment	23 106 763-0 23 106 764-8
. Ribbon assembly (right)		23 106 765-1
INGREDIENTS		
Oil (can)	ESSO MILKOTE K 55	23 007 213-2
Grease (tube)	ESSO GREASE L	23 007 214-0

DESCRIPTION AND USE OF SPECIFIC TOOLS : See special document

CAUTION

During dissassembly, do not remove painted screws without the previous surety of specific tooling avaibility.

In case of removal of such screws, do not omit to varnish them again during assembly.

1 – OPERATIONAL CONSOLE

1.1 INITIAL TESTING

- Test the various circuits of the card using a connection built from a receptacle for a 17–pin plug–in connector.

1.2 DISASSEMBLY - ASSEMBLY

- Replace the defective element(s) making sure not to bend the leads of diodes and resistors too near to their bodies.

1.3 FINAL TESTING

- Test all the applications of the board once again using the same connection.

2 – PUNCH BACK-SPACER (TAPE PUNCH)

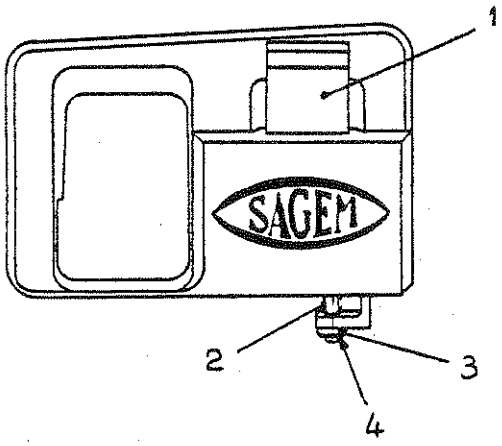
2.1 INITIAL TESTING

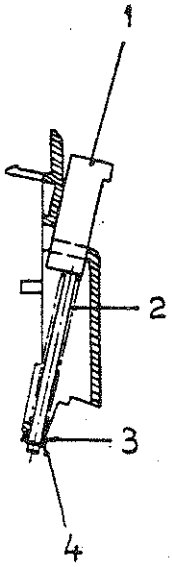
- Visually check the condition of the parts.
- Check the operation of the key.

2.2 DISASSEMBLY - ASSEMBLY

1) Disassembly

- Remove lock ring (4) and bushing (3).
- Remove key (1) and spring (2).





2) Assembly

- Proceed in the opposite order to disassembly.

2.3 FINAL TESTING

- Repeat the initial test described above.

3 – KEYBOARD

3.1 INITIAL TESTING

1) Static testing

- Visually check the condition of the parts.
- Operate the keys one by one to detect any sticking.
- Check the resistors, diodes, capacitors and contacts on an ohmmeter.

2) Dynamic testing

- If none of the parts shows signs of hard and fast failure, connect a 23-pin connector to plug P1.
- Supply the card with + 5 V and - 15 V using two stabilized power supplies.
- Test the reference voltages : - 9 V and - 12 V.
- Test the element values (CCITT code No. 2) for each key and check the PC1 and PC2 Character Presence pulses.

3.2 DISASSEMBLY - ASSEMBLY

- Replace the defective part(s) making sure not to bend the leads of resistors, diodes and capacitors too near to their body.
- To replace a diode located near a key :
  - remove the cap from the key by pulling it upwards,
  - unsolder and remove the key body from its recess,
  - unsolder the defective diode and remove it with tweezers,
  - assemble the new diode and key following the disassembly procedure in the opposite order.

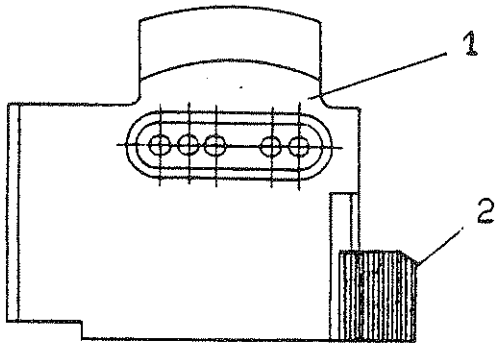
3.3 FINAL TESTING

- Test all the functions and all the moment codes using the set-up described in the first paragraph.

4 – TAPE READER

4.1 INITIAL TESTING

- Visually check the condition of the parts.
- Check the opening and closing of tape lid (1) by pressing lock (2).



- Manually test the rotation of the motor-sprocket wheel assembly.
- Check the condition of the wiring (connector or wires broken).
- On an ohmmeter, check the windings of the motor as shown in the following table :

Measurement points on connector	Resistance value (typical)
12/11	500 Ω
10/9	500 Ω
9/8	250 Ω
10/8	250 Ω
12/8	250 Ω
11/8	250 Ω

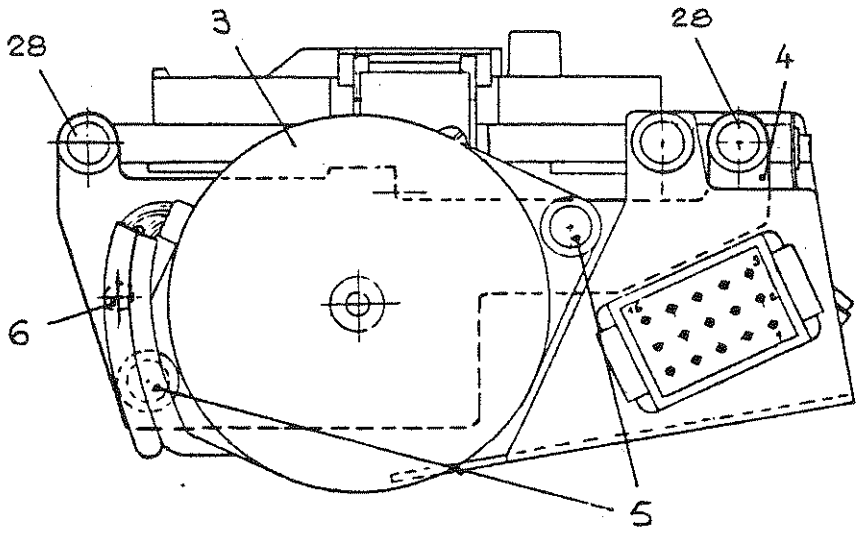
4.2 DISASSEMBLY - ASSEMBLY - ADJUSTMENT

1) Disassembly

MOTOR (3)

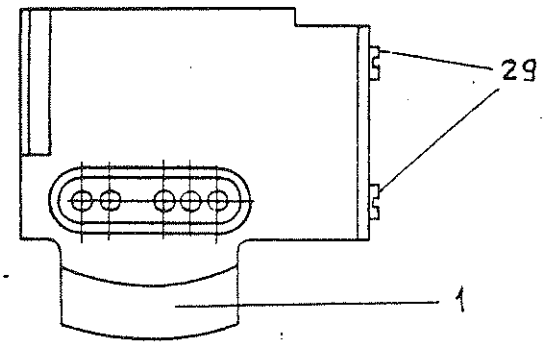
- Remove the screw (6) and the two attaching screws (5) from the motor flange (4).

NOTE : During the removal of the wired motor, use an extractor to remove the male contacts of the connector, associated with the motor.



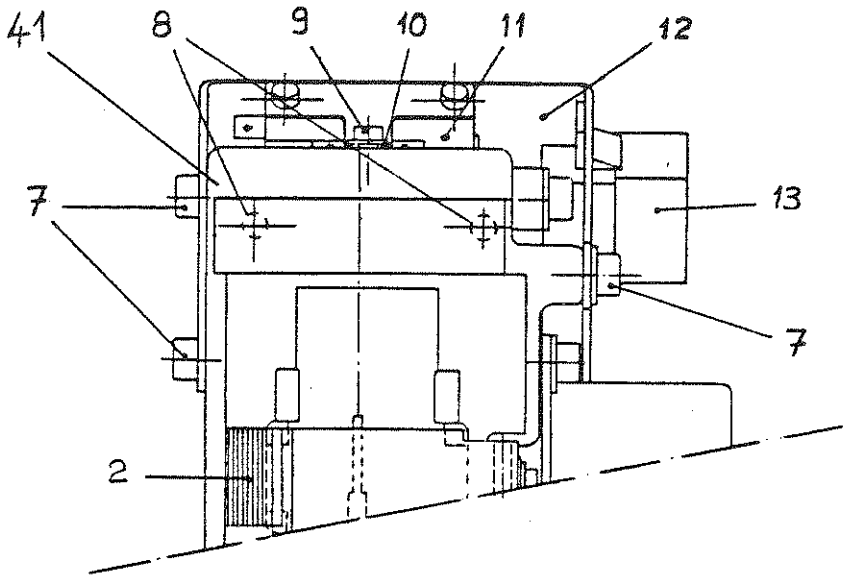
TAPE LID (1)

- Remove motor (3).
- Remove two attaching screws (29).
- **Remove tape lid (1).**



FEELERS BLOCK ASSEMBLY (11)

- Unhook the tape lid lock (2) return spring from the metal cover (12).
- Release connector (13) from its recess.
- Remove three screws (7) and remove the metal cover (12).
- Remove screw (9) holding adjusting bracket (10) to main casting (41).
- Remove both screws (8) and remove the feelers block assembly (11) together with the attaching clamp.



NOTE : When removing the feelers block assembly, remove the relative male contacts from connector (13) using the appropriate extractor.

CONTACT BLOCK (17)

- Remove feelers block assembly (11).
- Unsolder the six wires from the contacts (19).
- Remove both screws (18), the adjusting bracket (10) and the contact block (17).

ELEMENT FEELERS (21), TAPE OUT FEELER (14) AND FELT PACKINGS (15)

- Remove the feelers block assembly (11).
- Remove the contact block (17).
- Withdraw shaft (16) equipped with feelers (14 and 21) and felt packings (15) from its recess (20).
- Remove element feelers (21), tape out feeler (14) and felt packings (15).

54-TOOTH GEAR (22) AND 36-TOOTH SPROCKET WHEEL (24)

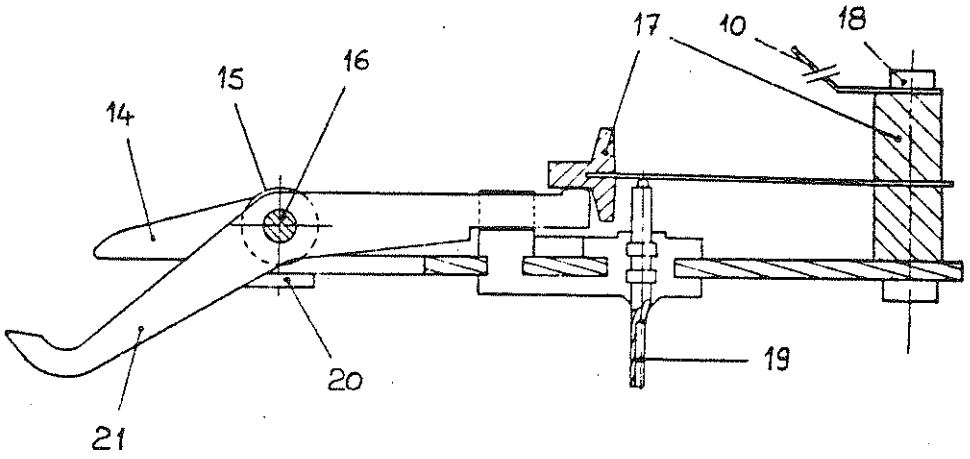
- Unhook the tape lid lock (2) return spring from the metal cover (12).
- Remove metal cover (12) and the motor and flange assembly (4).
- Remove the 54-tooth gear (22) and the 36-tooth sprocket wheel (24).

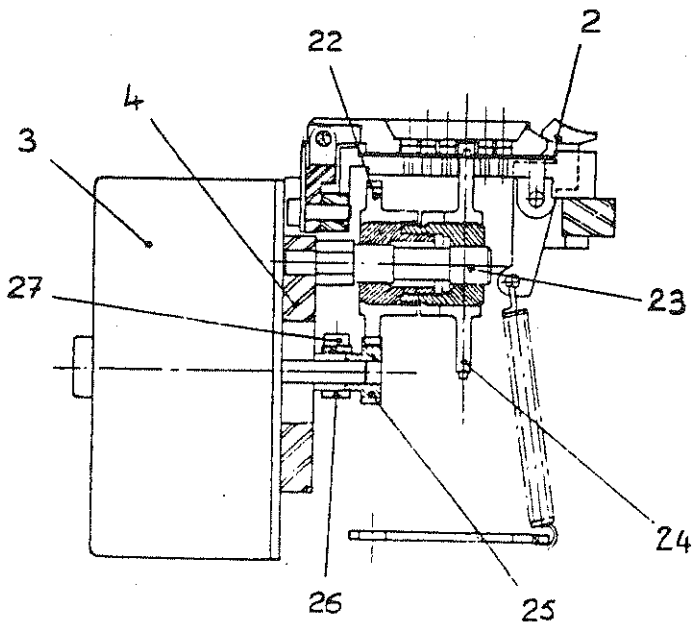
SHAFT (23) OF 36-TOOTH SPROCKET WHEEL (24)

- Remove 54-tooth gear (22) and 36-tooth sprocket wheel (24).
- Unscrew and remove shaft (23).

18-TOOTH PINION (25)

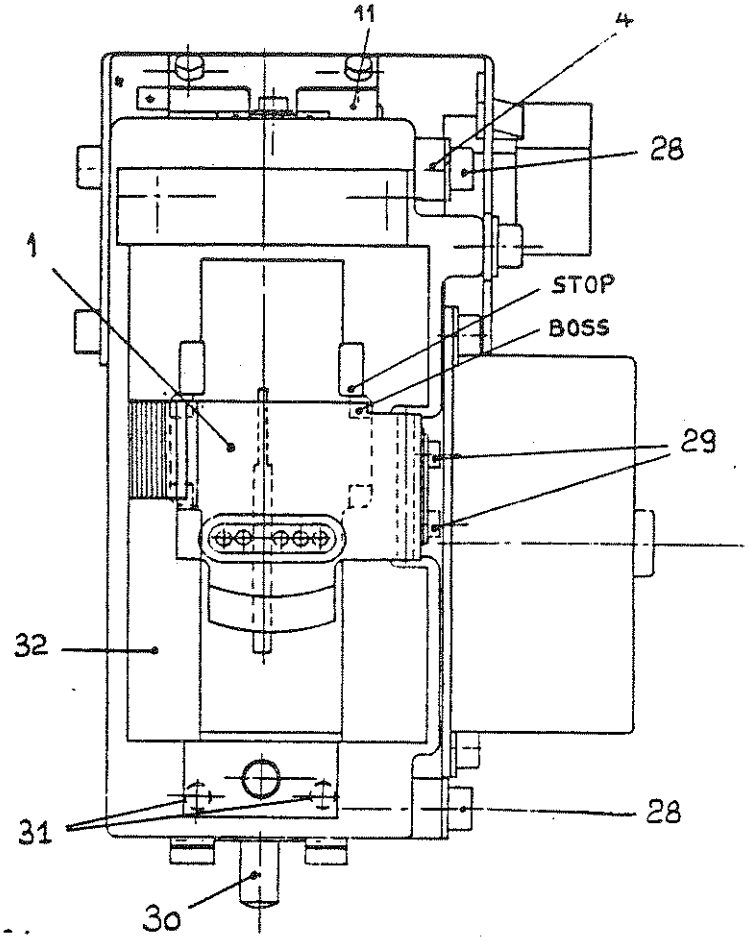
- Detach the two screws attaching motor (3) to disengage pinion (25) from the 54-tooth gear (22).
- Loosen screw (29) from the clamp (26).
- Remove the 18-tooth pinion (25).





TAPE GUIDE PLATE (32)

- Remove feelers block (11) without removing the contacts from the connector.
- Remove both attaching screws (28) and remove the motor and flange assembly (4).
- **Remove both screws (29) and remove tape lid (1).**
- Remove both screws (31) and remove plunger (30).

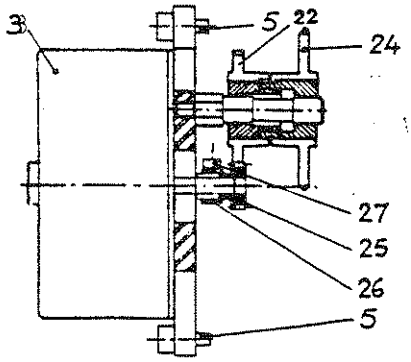


2) Assembly - Adjustment

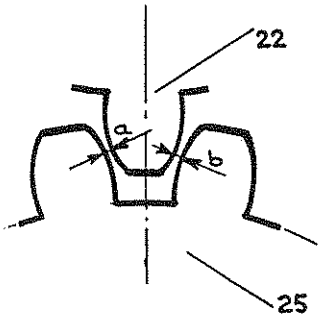
MOTOR (3)

a) Assemble by following the disassembly procedure in the opposite order.

After assembling motor (3) :



- adjust a clearance of 0.1mm maxi between motor pinion (25) and the 54-tooth sprocket wheel gear (22),
- lock the two attaching screws (5),
- check for restraint-free rotation, readjust the clearance , if necessary.

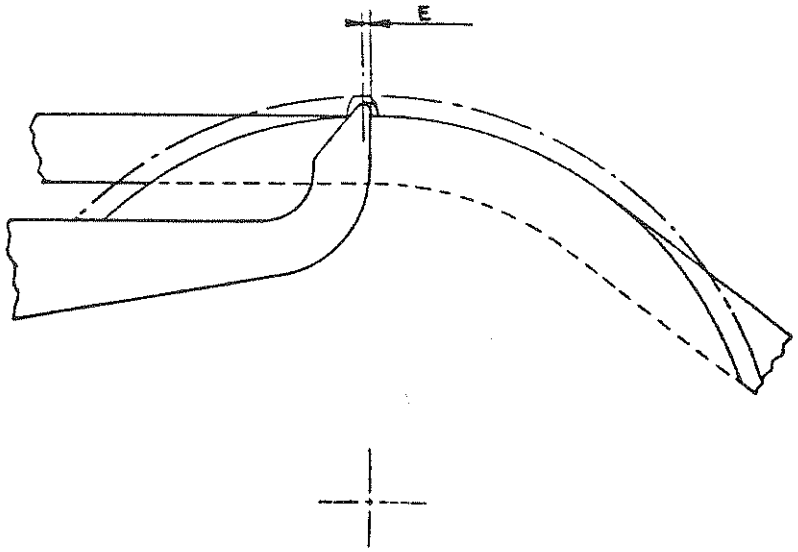


a + b = 0,1mm. maxi

b) Loosen screw (27) on clamp (26) retaining the 18-tooth pinion (25).

Apply power to feed motor (3) (+ 12 V) (see diagram of "PIA LECTEUR + AMPLI" board).

Turn the 18-tooth pinion (25) to obtain a dimension E between 0.25 and 0.45 mm between the centre of one sprocket and the end of the feelers.



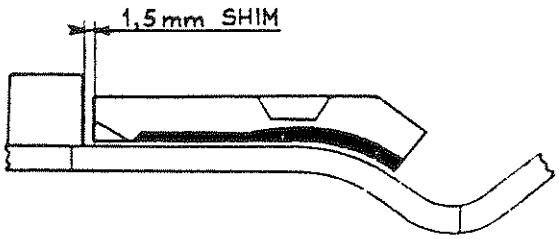
Lock screw (25) of clamp (26) retaining the 18-tooth pinion (25).

Disconnect the power supply from feed motor (3).

NOTE : This adjustment can be made using the tool 23 106 759-9.

TAPE LID (1)

- Install tape lid (1) without tightening screws (29).
- Bring tape lid (1) to bear against the four bosses of the tape guide plate (32).
- Insert a 1.5 mm shim between the two stops of tape guide plate (32) and tape lid (1).
- Bring tape lid (1) to bear against the shim.
- Tighten the two attaching screws (29).

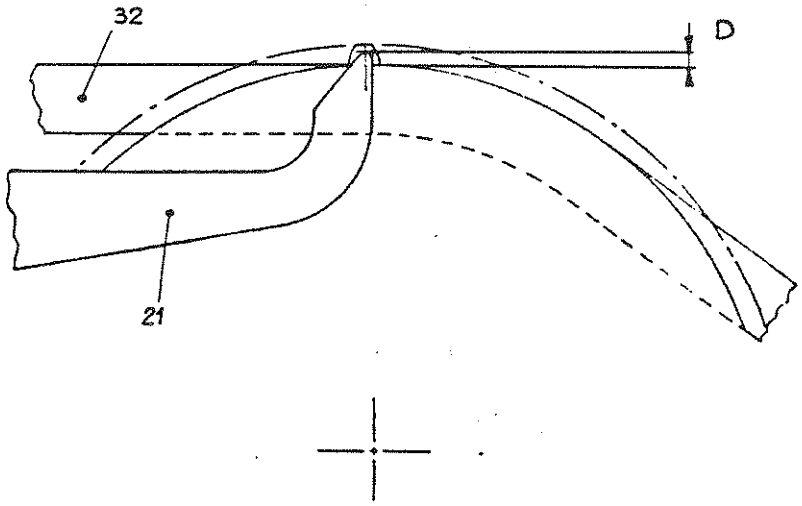


NOTE : This adjustment can be made using the tool 23 106 759-9.

- Install motor (3) and carry out the corresponding adjustments.

FEELERS BLOCK ASSEMBLY (11)

- Assemble by following the disassembly procedure in the opposite order.
- Before tightening screw (9) of adjusting bracket (10), adjust the protrusion of feelers (21) to obtain :
  - Opening of element contacts (—●—) for protrusion D of feelers (21) AT LEAST equal to 0.5 mm.
  - Closing of element contacts (—●—) for protrusion D of feelers (21) AT MOST equal to 0.75 mm



NOTE : This adjustment can be made using the tool 23 106 759-9.

CONTACT BLOCK (17)

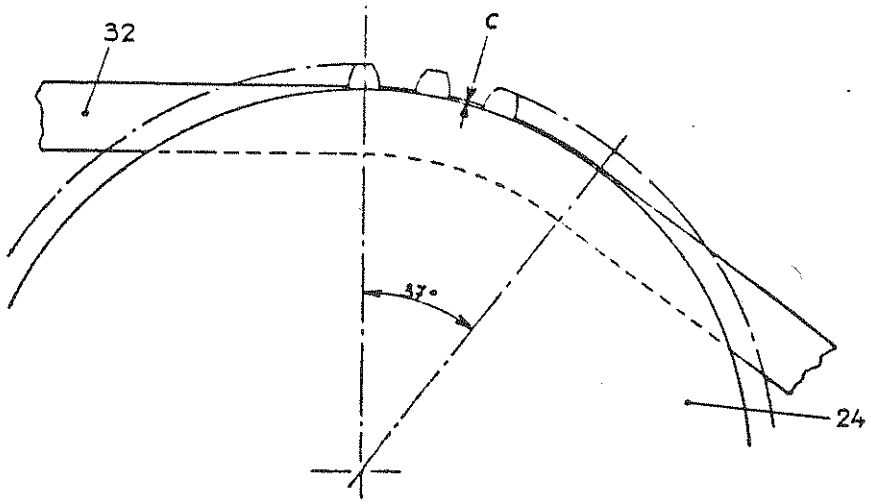
- Assemble by following the disassembly procedure in the opposite order.
- During assembly of the feelers block assembly (11), adjust the protrusion of feelers (21).

ELEMENT FEELERS (21), TAPE OUT FEELER (14) AND FELT PACKINGS (15)

- Assemble by following the disassembly procedure in the opposite order.
- During assembly of the feelers block assembly (11), adjust the protrusion of feelers (21).

54-TOOTH GEAR (22) AND 36-TOOTH SPROCKET WHEEL (24)

- Assemble by following the disassembly procedure in the opposite order.
- Before locking both attaching screws (28) of motor and flange assembly (4), adjust the position of the tape guide plate (32) :
  - Within the 37° curved section of the tape guide plate (32), adjust motor and flange assembly (4) to obtain a clearance C of 0.1mm MAXIMUM between the top of the tape guide plate and the rim of the 36-tooth sprocket wheel.



NOTE : This adjustment can be made using the tool 23 106 759-9.

- Lock both attaching screws (28) of the motor and flange assembly (4).
- Complete the assembly and PROCEED TO ADJUSTMENT (paragraph : MOTOR, adjustment b).

SHAFT (23) OF 36-TOOTH SPROCKET WHEEL (24)

- Assemble by following the disassembly procedure in the opposite order.
- During assembly, check the corresponding adjustments.

18-TOOTH PINION (25)

- Assemble by following the disassembly procedure in the opposite order.
- Before tightening both attaching screws (5) of motor (3), perform the adjustments described in the paragraph : MOTOR.

TAPE GUIDE PLATE (32)

- Assemble by following the disassembly procedure in the opposite order.
- Before locking both attaching screws (29), adjust the tape lid (1) (paragraph : TAPE LID).
- Before locking both attaching screws (28) of the motor and flange assembly (4), adjust the position of the tape guide plate (paragraph : 54-TOOTH GEAR AND 36-TOOTH SPROCKET WHEEL).
- Before assembling feelers block assembly (11), PERFORM ADJUSTMENT (paragraph : MOTOR, adjustment b).
- Before locking screw (9) of adjusting bracket (10) of feelers block assembly (11), adjust the protrusion of these feelers (21) (paragraph :FEELERS BLOCK ASSEMBLY).

4.3 FINAL TESTING

- Repeat the initial testing described previously.

5 - TAPE READER (WITH TIGHT TAPE DETECTOR)

5.1 INITIAL TESTING

- Perform the checks described in the paragraph entitled TAPE READER.
- Check the tight tape detector contact movement by means of an ohmmeter.

5.2 DISASSEMBLY - ASSEMBLY - ADJUSTMENT

1) Disassembly

The parts are disassembled in the same way as for the TAPE READER except for :

FEELERS BLOCK ASSEMBLY (11)

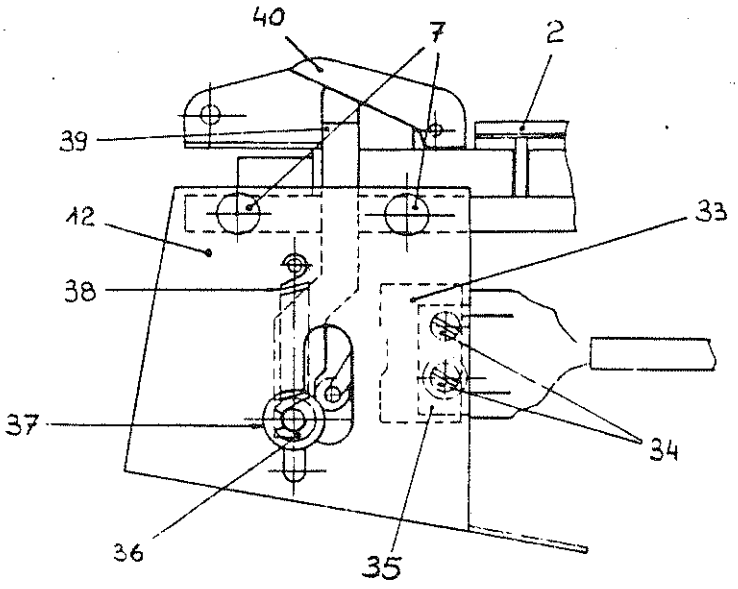
When removing the casing, remove from connector (13) the male contacts corresponding to the switch of the tight tape lever, using appropriate extractor.

54-TOOTH GEAR (22) AND 36-TOOTH SPROCKET WHEEL (24)

The casing is removed as above.

CONTROL LEVER (39) AND SWITCH (33) DETECTING TIGHT TAPE

- Unhook the tape lid lock (2) return spring from the metal cover (12).
- Release the connector (13) from its recess.
- Remove the three screws (7) and metal cover (12).
- Remove from the connector (13) the male contacts corresponding to switch (33).
- Remove both screws (34), board (35) and remove switch (33).



- Unhook and remove spring (38).
- Remove lock ring (36), washer (37) and remove lever (39).

2) Assembly - Adjustment

Assembly and adjustment of the parts are performed in the same way as for the TAPE READER except for :

FEELERS BLOCK ASSEMBLY (11)

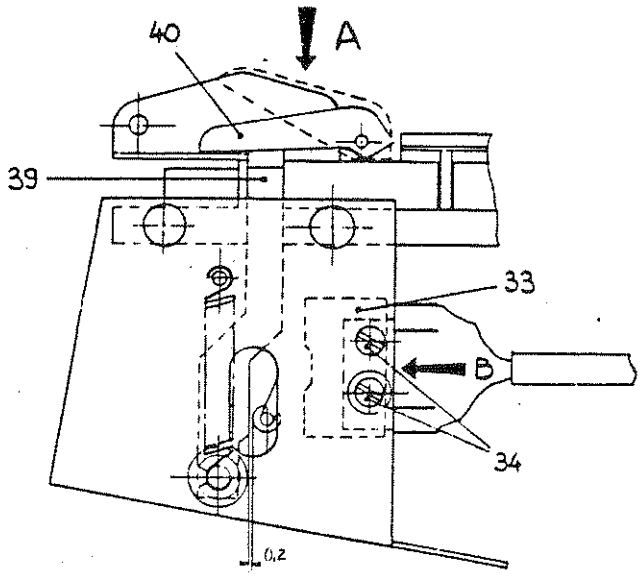
Before installing the casing, insert in the connector the male contacts corresponding to switch (33) of the tight tape lever.

54-TOOTH GEAR (22) AND 36-TOOTH SPROCKET WHEEL (24)

The casing is installed as above.

CONTROL LEVER (39) AND SWITCH (33) DETECTING TIGHT TAPE

- Assemble following the disassembly procedure in the opposite order, without locking the two attaching screws (34) of switch (33).
- Press hard on tight tape lever (40) as shown by arrow (A).
- Insert the 0.2 mm shim in the gap provided for this purpose between lever (39) and switch wafer (33).
- Press fully on switch (33) as shown by arrow (B) but without excessive force.
- In this configuration, lock both attaching screws (34) of switch (33).
- Release tight tape lever (40) and remove the 0.2mm shim.
- Check the operation of switch contact (33) by pressing tight tape lever (40)



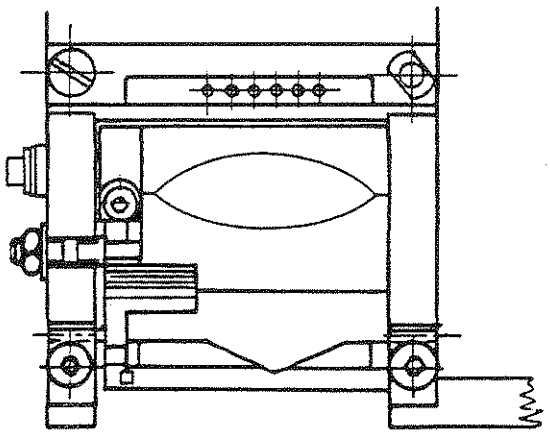
5.3 FINAL TESTING

- Repeat the initial testing described previously.

6 – TAPE PUNCH

6.1 INITIAL TESTING

- Check the condition of the parts.
- Check that the tape presser opens and closes.



- Withdraw the drive pawl from the ratchet and, holding it back, check the movement of the parts.
- Check the condition of the wiring (connector or wires broken).
- Using an ohmmeter, check the windings of the solenoids and motor as shown in the table below :

Measurement points of connector	Resistance value (typical)
1/7 EL 1	40Ω
2/7 EL 2	40Ω
3/7 EL 3	40Ω
4/7 EL 4	40Ω
5/7 EL 5	40Ω
6/7 FEED HOLE	40Ω
9/10 P.U.	1500Ω*
11/12 TAPE FEED	14Ω
13/12	∞
13/14 MOTOR	25Ω

* punch connected to unit.

The adjustments can only be checked after some of the parts have been removed. The following paragraph describes disassembly allowing the detection of any defect and their gradual adjustment during assembly.

6.2 DISASSEMBLY - ASSEMBLY - ADJUSTMENT

1) Disassembly

CHAD GUIDE

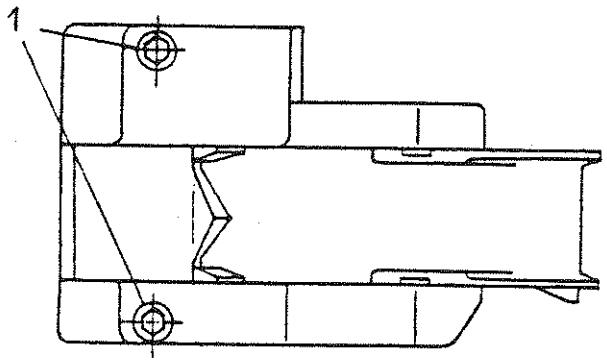
- Remove the knurled knob from the chad guide.
- Remove the chad guide.

BASE PLATE

- Remove the three attaching nuts from the base plate of the TAPE PUNCH.
- Remove the connector from its recess.
- Remove the base plate.

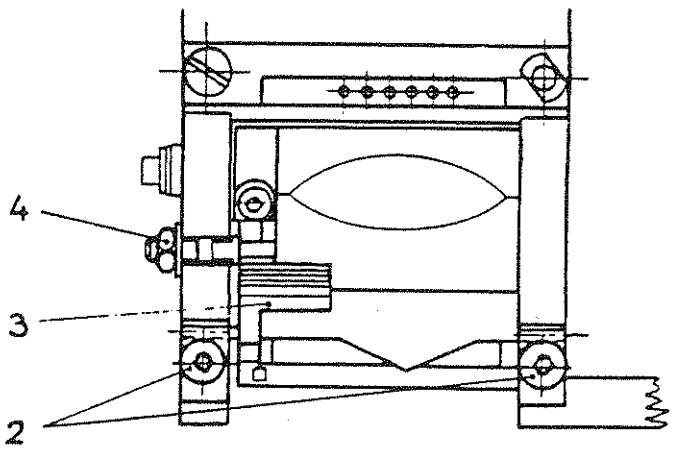
TAPE GUIDE

- Remove both attaching screws (1).
- Remove the tape guide.



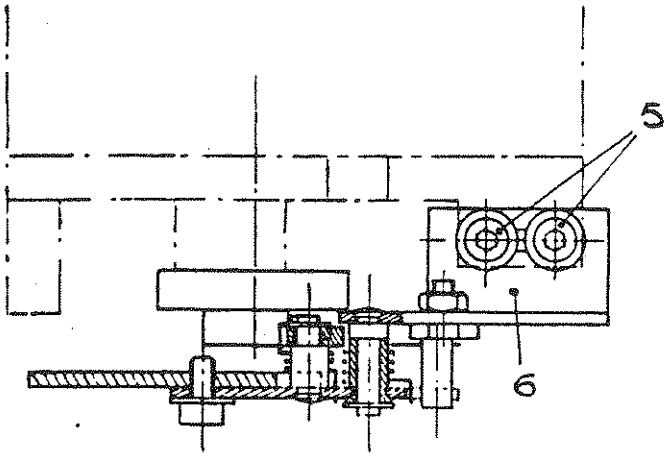
TAPE PRESSER

- Remove both attaching screws (2) together with the retaining plates.
- Release attaching nut (4) on the shaft of the locking pawl (3).
- Remove the tape presser assembly by tilting it to the front of the TAPE PUNCH.



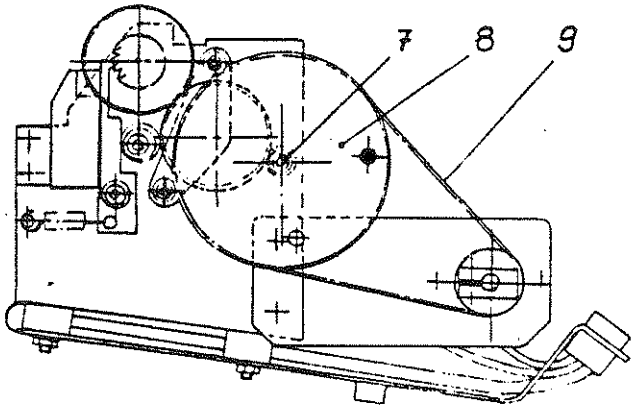
PUNCH BACK-SPACER (6)

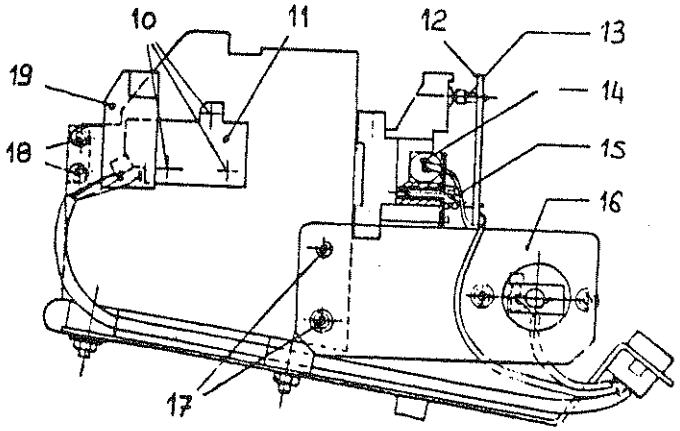
- Remove the two attaching screws (5).
- Remove punch back-spacer (6).



ELECTRICAL ASSEMBLY

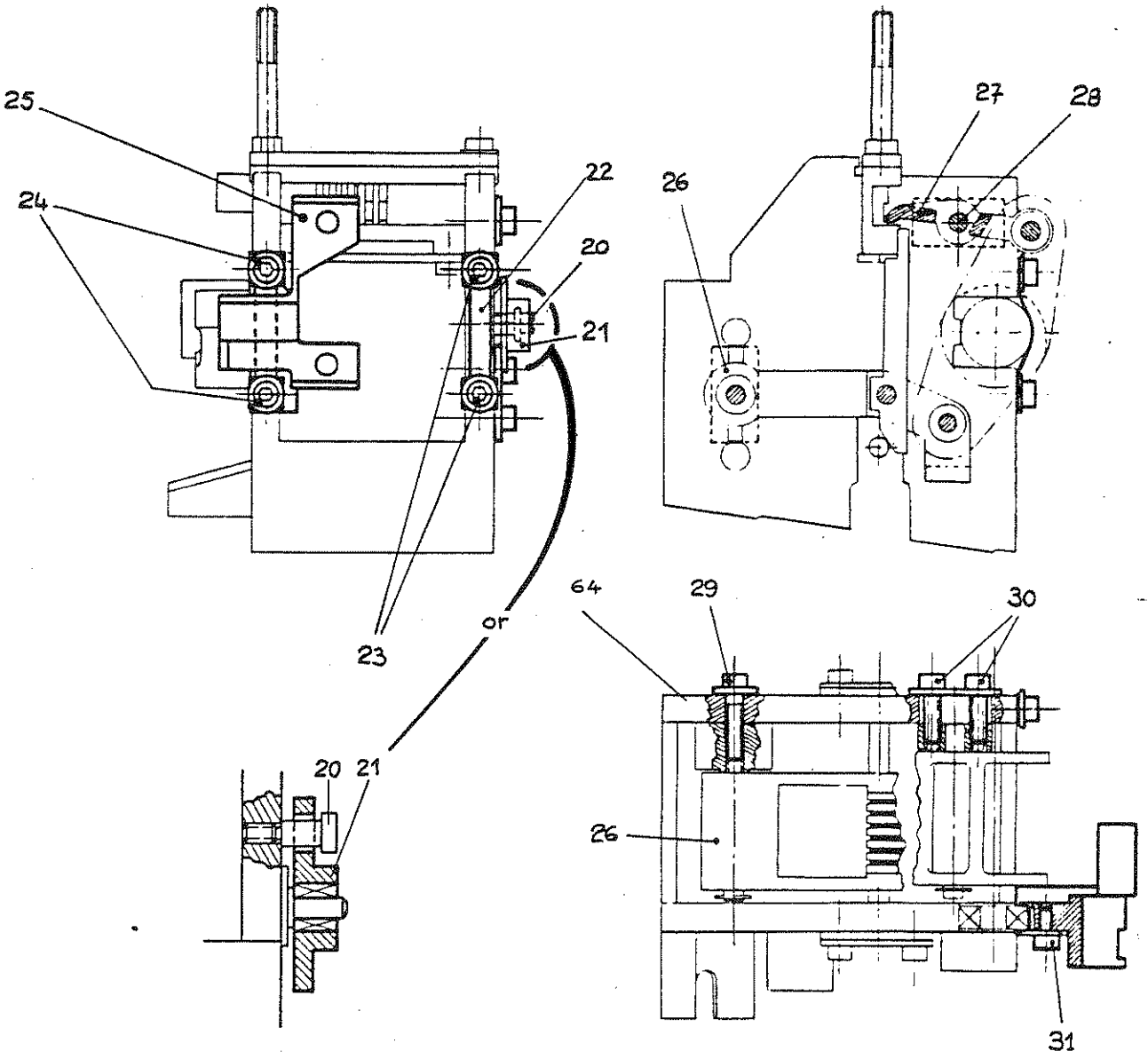
- Release belt (9) from the 90-tooth pulley (8) and remove it.
- Remove screw (7) and remove the 90-tooth pulley (8).
- Remove both attaching screws (18) and release the electromagnet (19).
- **Remove the three punch solenoid attaching screws (10) and the block of six electromagnets (11).**
- **Remove attaching screw (15) and the retaining plate, and release the coil (14).**
- Squeeze the lock of each board support (13) and release the "synchronisation" board (12).
- Remove both attaching screws (17) and release the motor and flange assembly (16).



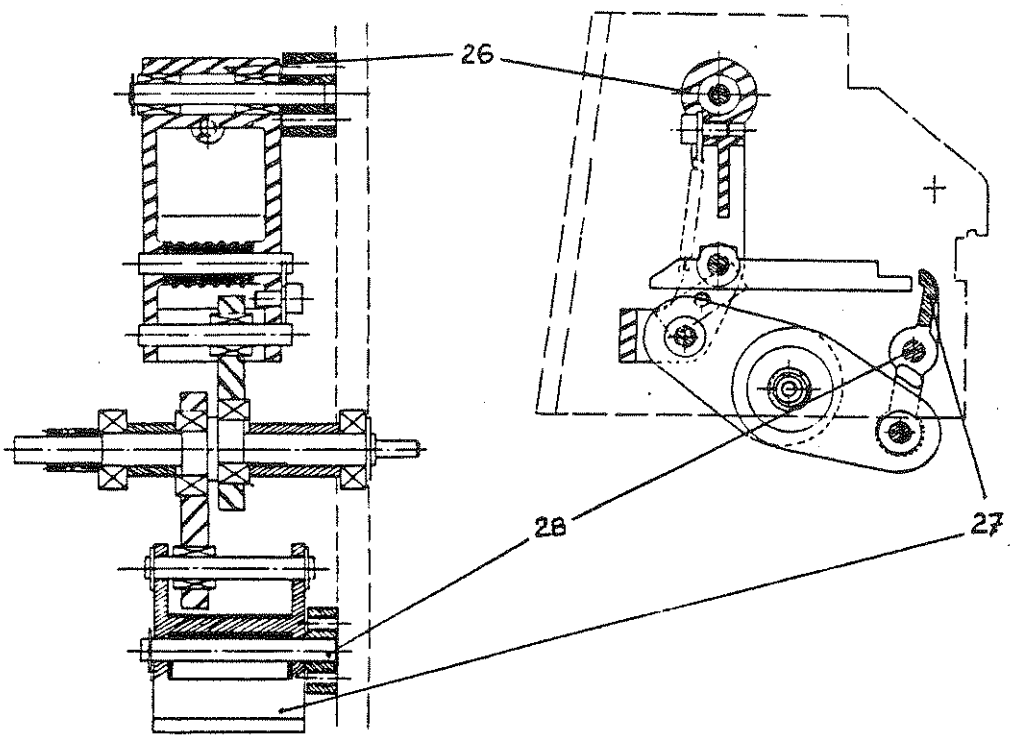


CONNECTING ROD ASSEMBLY

- Remove retaining screw (20) with its spacer and remove the anti-backlash clutch (21).
- Loosen the screw (31), remove two attaching screws (24) and the ball bearing retaining clamp.
- Remove both attaching screws (23) and remove the retaining clamp.
- Remove both attaching screws (29) from pivot point (26) of the connection rod assembly and the plate (64).
- Remove both attaching screws (30) from shaft (28) of the punch return lever (27) and the plate (64)
- Release the punch return lever (27) upwards and remove the connecting rod assembly.

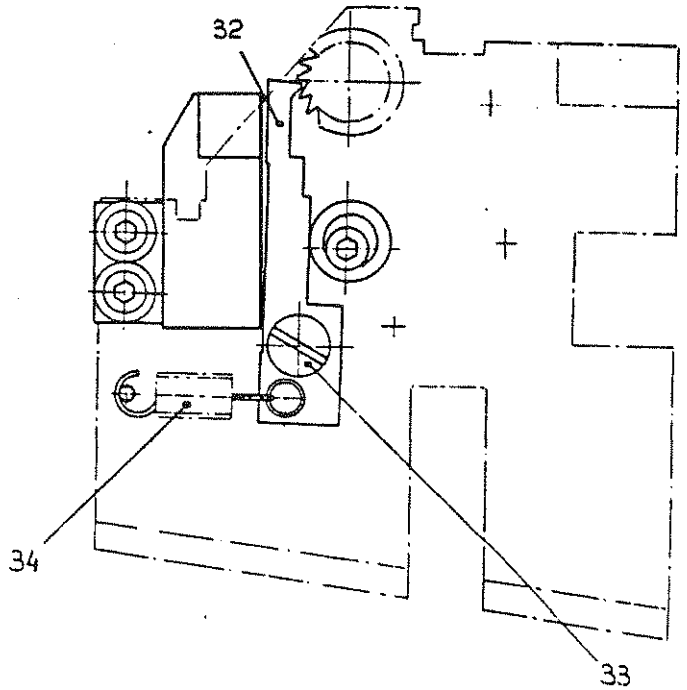


- In disassembling the connecting rod parts, refer to the following figure.



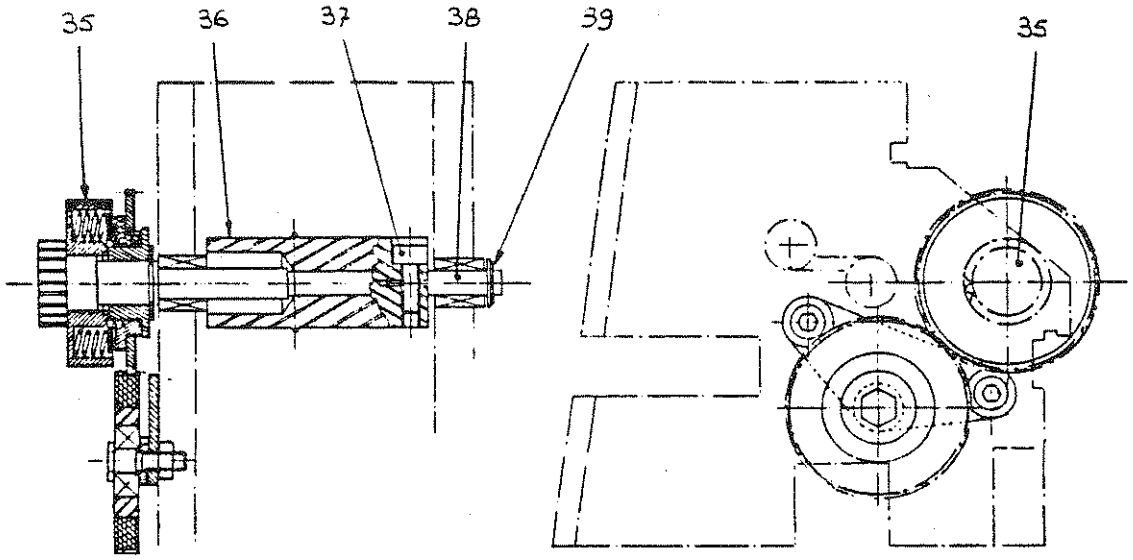
DRIVE PAWL (32)

- Unhook the return spring (34).
- Remove the screw-shaft (33) by holding constantly the lever against the head of the screw (needle bearing).
- Remove the drive pawl (32) and its screw-shaft without separating them.



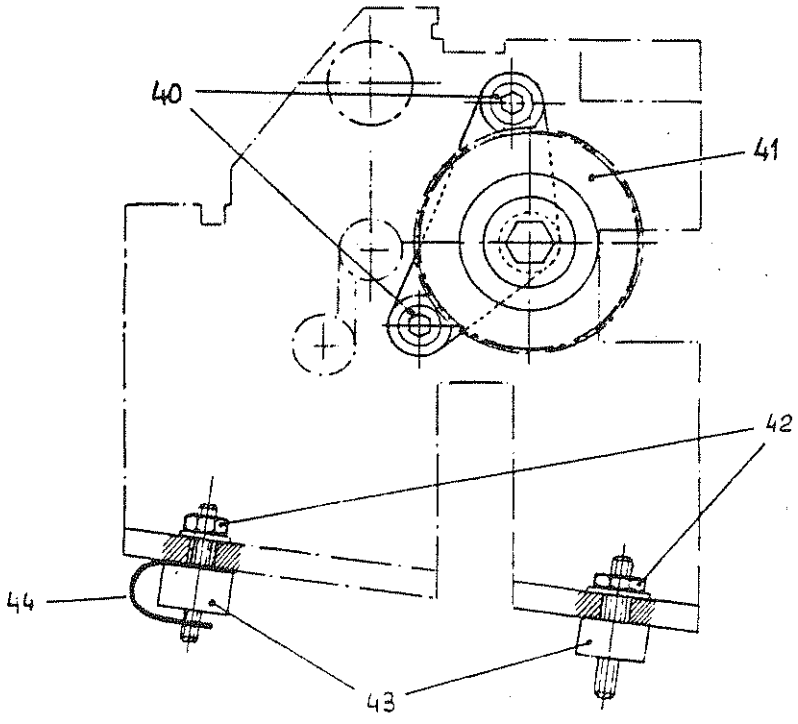
FRICTION (35)

- Loosen locking screw (37) from sprocket wheel (36).
- Remove the "GRIP RING" locking ring (39) using the specialized pliers.
- Hold sprocket wheel (36) and remove shaft (38).
- Remove friction assembly (35).



PINION (41) AND DAMPERS (43) ASSEMBLY

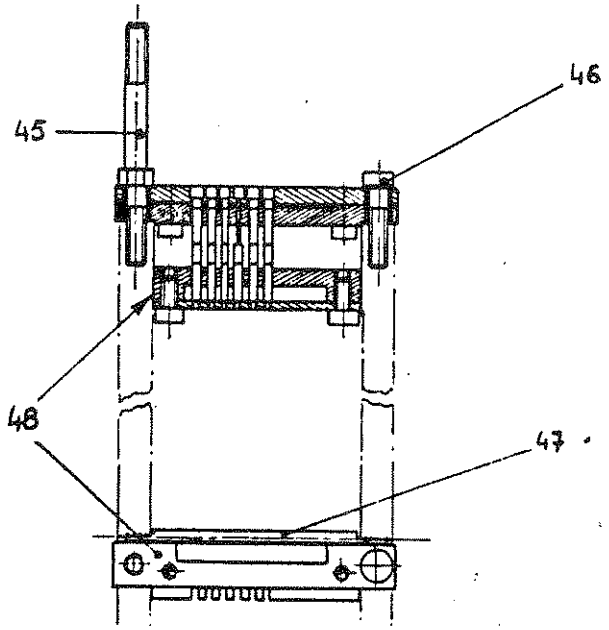
- Remove both attaching screws (40) and pinion assembly (41).
- Remove the three attaching nuts (42) from the dampers (43) and their washer.
- Remove the three dampers (43) taking care of the ground interconnection (44).



PUNCH BLOCK (48) AND DEFLECTOR SHAFT (47)

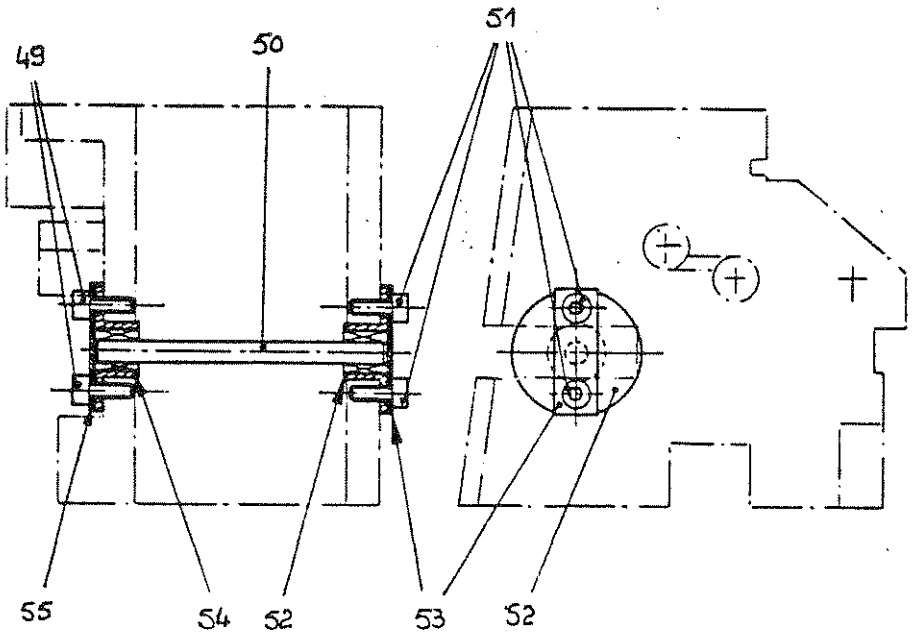
- Remove the attaching screw (46).
- Remove the column (45) attaching the chad guide.
- Release and remove the punch block (48) and deflector shaft (47).

CAUTION : The punch block assembly (48) cannot be disassembled.



PUNCH SETTING LEVER RETURN SHAFT (50)

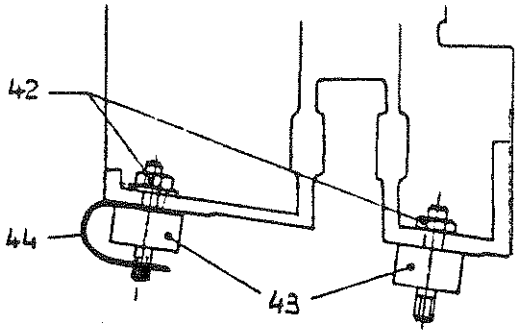
- Remove both attaching screws (49) and plate (55).
- Remove both attaching screws (51) and plate (53).
- Remove bearings (52) and (54).
- Remove the punch setting lever return shaft (50).



2) Assembly - Adjustment (the part indexes are identical to those relating to disassembly)

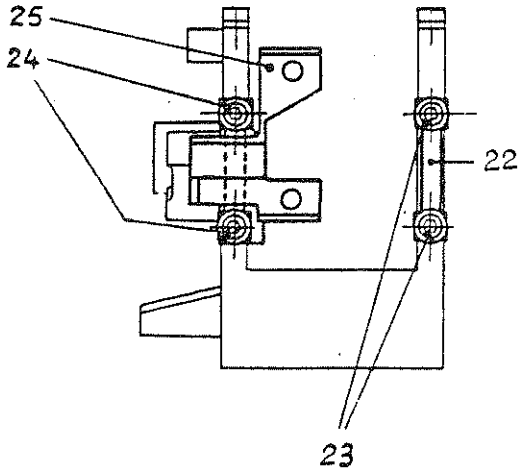
DAMPERS (43)

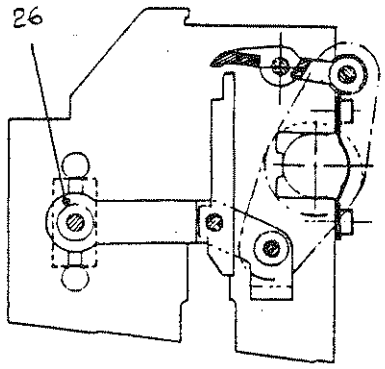
- Replace the three dampers (43) by inserting the ground-link (44).
- Install the washers and the three attaching nuts (42) and lock them.
- Insert the free end of the ground-chassis link (44) into the lower threaded rod of damper (43).

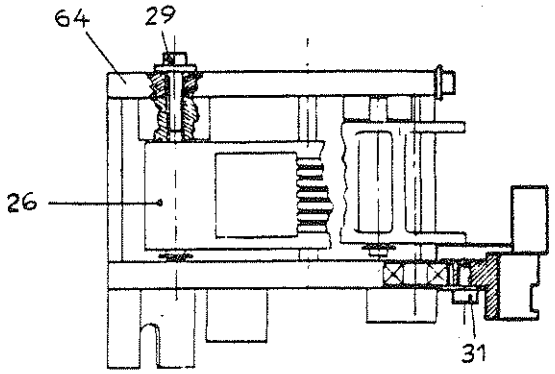


CONNECTING ROD ASSEMBLY

- Insert the connecting rod in the structure and install the two attaching screws (29) of pivot point (26) with the plate (64).
- Moderately tighten these two screws while placing pivot point (26) approximately at the center of the hole.
- Place the connecting rod bearings in their recess.
- Install the clamp, the support (25) and both attaching screws (24) without locking them.
- Install clamp (22) and both attaching screws (23), fitted with their washers, without locking them.
- Tighten locking screw (31) and lock the attaching screws (23) and (24).
- Check that all the punch setting lever return springs are properly hooked.

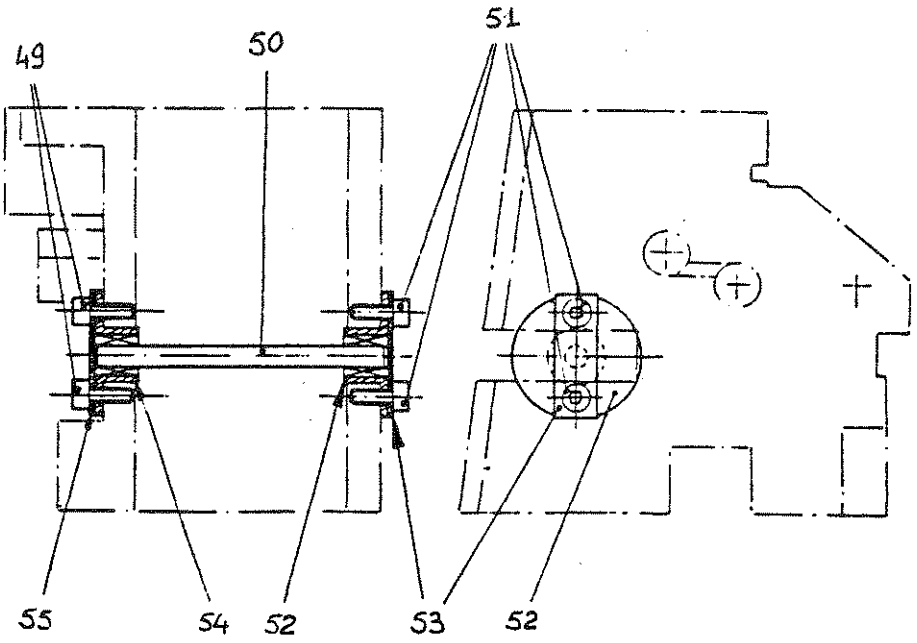






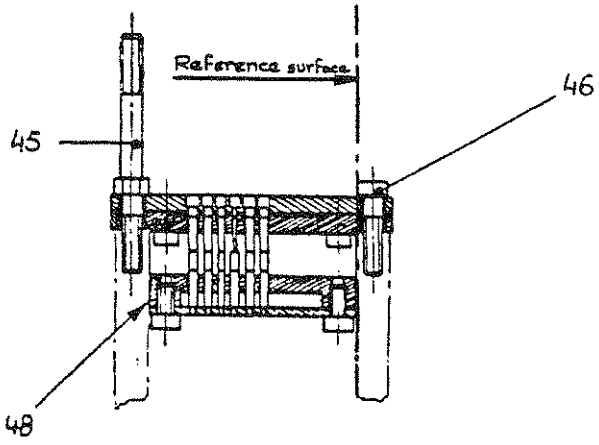
PUNCH SETTING LEVER RETURN SHAFT (50)

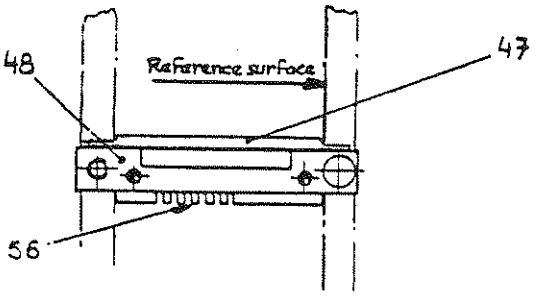
- Lubricate the grooves of bearings (52) and (54) and the punch setting lever return shaft (50) along its entire length.
- Install bearing (52) fitted with plate (53) without tightening the attaching screws (51).
- Move the punch setting levers forwards to clear the location of shaft (50) and insert shaft (50) in bearing (52).
- Place bearing (54) fitted with plate (55) without tightening the attaching screws (49).



PUNCH BLOCK (48) AND DEFLECTOR SHAFT (47)

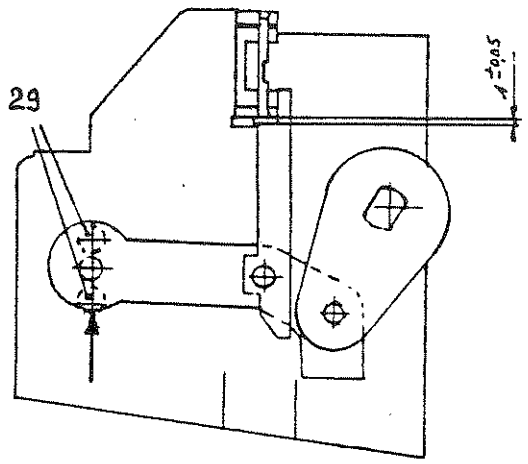
- Install and center deflector shaft (47) in the grooves provided for it.
- Place the punch block (48) in its recess and engage the punch setting levers in comb (56).
- Install attaching screw (46) and column (45) retaining the chad guide.
- Lock screw (46) and column (45) while holding the punch block (48) against the reference surface.





ADJUSTMENT OF PUNCH TRAVEL

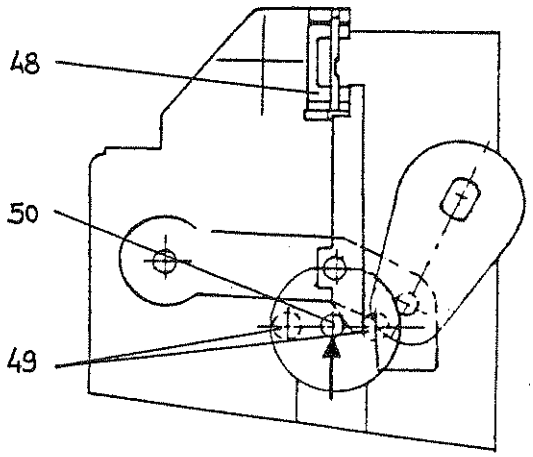
- Using the 90-tooth pulley wheel, bring the excentric to the lower neutral point and hold it in this position (see paragraph SETTING AND RETAINING OF LOWER NEUTRAL POINT).
- Engage the end punch setting levers under the punches and hold them in this position.
- Loosen the two attaching screws (29) and turn the assembly to obtain 0.95 to 1.05 mm between the heel of the punches and the punch setting levers.
- Lock the two attaching screws (29).



NOTE : This adjustment can be made using the tool 27 356 345-6.

ADJUSTMENT OF THE PUNCH SETTING LEVER RETURN SHAFT

- Retain the eccentric at the lower neutral point.
- Maintain the punch setting levers against the punch block (48) without any clearance.
- Loosen the four attaching screws (49) and (51) of the punch setting levers return shaft bearings.
- Bring return shaft (50) to bear hard against the punch setting levers heels.
- Lock the four attaching screws (49) and (51).
- Using tweezers, make sure there is no clearance between the punch setting levers and the punch block (48).
  IF ANY PLAY WHATSOEVER IS DETECTED, READJUST ACCORDINGLY.



NOTE : This adjustment can be made using the tool 27 356 345-6.

ELECTRICAL ASSEMBLY

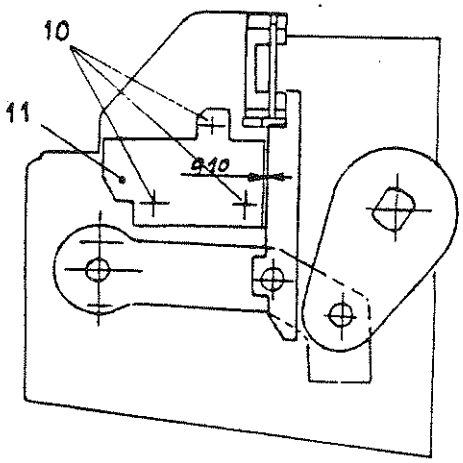
- Perform assembly by following the removal procedure in the opposite order, but do not install the 90-tooth pulley.

BASE PLATE

- Carry out assembly following the disassembly procedure in the opposite order.

ADJUSTMENT OF BLOCK OF 6 ELECTROMAGNETS (11)

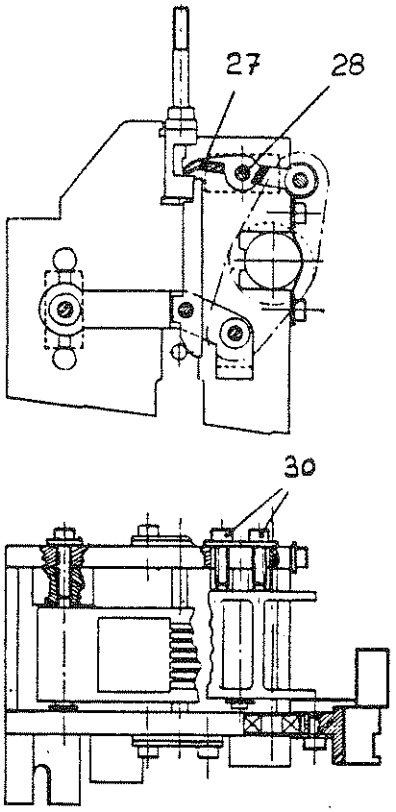
- **Using the 90-tooth pulley, bring the eccentric to the lower neutral point and hold it in this position.**
- **Insert a 0.1 mm shim between the punch setting levers and the block of 6 electromagnets (11) through the hole provided for this purpose.**
- Loosen the three attaching screws (10) of the block of 6 electromagnets.
- Energize the block of 6 electromagnets with 5 V d-c.
- Lock the three attaching screws (10), taking care that the block of 6 electromagnets does not move during locking.
- Check size 0.1 mm over the whole surface of the block of 6 electromagnets after the screws have been locked.
- Cut off the power supply to the block of 6 electromagnets.

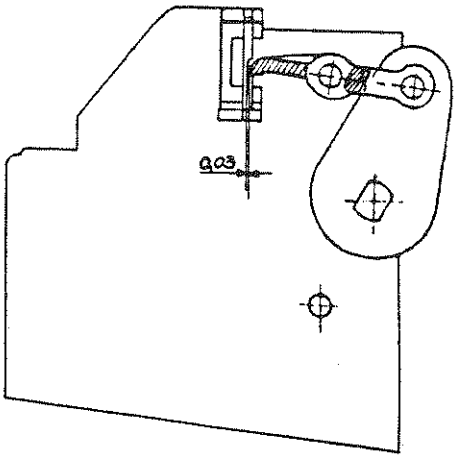


NOTE : **This adjustment can be made using the corresponding tools : spring balance, 0.1 mm shim, 5 V power supply, cable 27 356 416-4.**

ADJUSTMENT OF THE PUNCH RETURN LEVER

- **Align the punches so that their flat surfaces are turned towards the return lever (27) and hold the eccentric at the lower neutral point.**
- Bring the return lever (27) towards the punches.
- Place the two attaching screws (30) of shaft (28) of return lever (27) with the flat of the bushing turned upwards and install their plate, without locking them.
- Place a 0.03 mm shim under the end of the return lever (27) and the flat of the punches.
- Hold lever (27) against the shim and press hard towards the bottom of the punches.





- Lock the two attaching screws (30).
- Remove the 0.03 mm shim.
- Using tweezers, check that there is no clearance between return lever (27) and the lower flat of the punches.
  IF ANY PLAY IS DETECTED ON THE PUNCHES, READJUST ACCORDINGLY.
- Turn the 90-tooth pulley shaft and check that the return lever (27) does not drive the punches in its upwards motion.
  IF THE PUNCHES ARE DRIVEN BY THE RETURN LEVER, READJUST ACCORDINGLY.

NOTE : **The adjustment can be made using the tool 27 338 119-3.**

PINION ASSEMBLY (41)

- Assemble by following the disassembly procedure in the opposite order.

FRICTION (35)

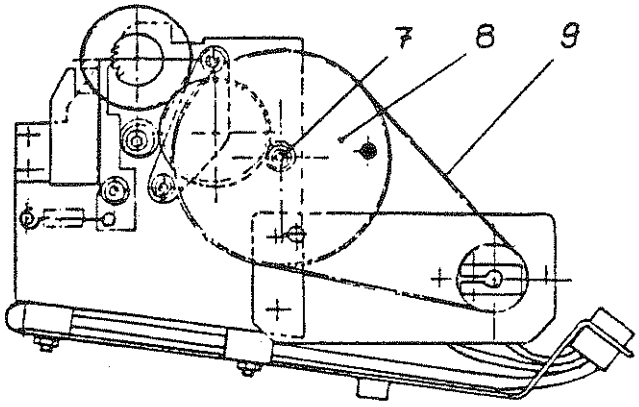
- Assemble by following the disassembly procedure in the opposite order.
- While installing the "GRIP RING" locking ring (39), do not forget to :
  . insert the 0.5 mm washer between the bearing and the locking ring,
  . provide a 0.05 to 0.1 mm lateral clearance between the locking ring and the washer abutting against the bearing.
- Do not tighten locking screw (37) of the sprocket wheel.
- Loosen the attaching screw of pinion assembly (41) and move it to obtain friction free meshing of the three pinions with minimum clearance.

DRIVE PAWL (32)

- Assemble by following the disassembly procedure in the opposite order.

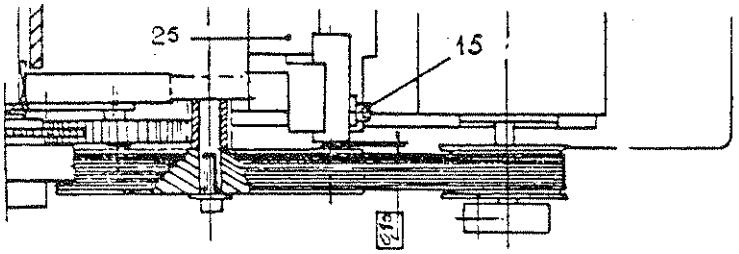
90-TOOTH PULLEY (8) AND BELT (9)

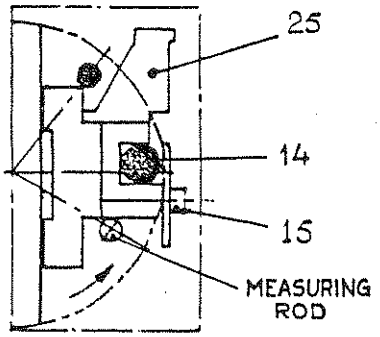
- Install 90-tooth pulley (8), its attaching screw (7) and its washer.
- Install belt (9) and check its tension by lifting it away from the motor.



SYNCHRONIZATION (PICK-UP) DEVICE ADJUSTMENT

- **Using the 90-tooth pulley, bring the eccentric to the lower neutral point and hold it in this position.**
- Loosen the attaching screw (15) of the coil (14) and back off the coil slightly.
- Insert a 0.1 mm shim between the soft iron core of the 90-tooth pulley and the coil (14).
- Bring the coil to bear against the shim ensuring that the magnetic core and the coil are perpendicular.
- Lock attaching screw (15) in this configuration and remove the 0.1 mm shim.
- **With the eccentric still held at the lower neutral point, loosen screw (7) attaching the 90-tooth pulley.**
- Insert a 4 mm rod in the smooth hole of the 90-tooth pulley and bring it to abut against the lower part of support (25) of the coil.
- Lock screw (7) attaching the 90-tooth pulley.

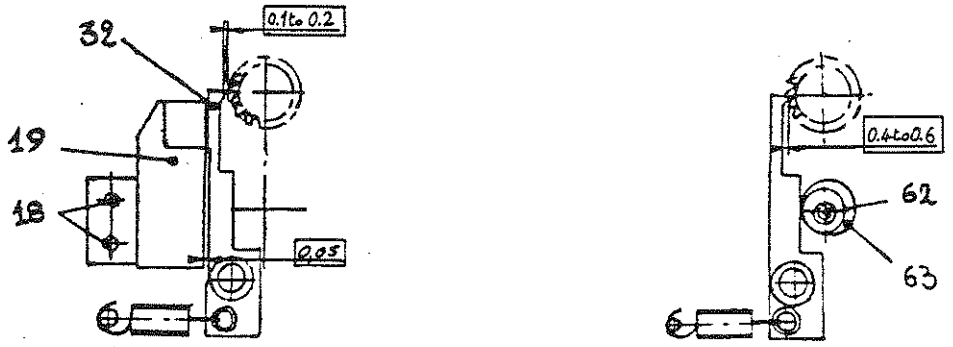




NOTE : This adjustment can be made using the tool 27 356 418-5.

ADJUSTMENT OF DRIVE SYSTEM

- Loosen the two screws (18) attaching electromagnet (19) of the drive system.
- Place a 0.05 mm shim between the drive lever (32) and the lower part of electromagnet (19).
- Energize the electromagnet at 5 V.
- Make sure there is 0.1 to 0.2 mm clearance between the end of the drive lever and the top of the nearest tooth, by moving the electromagnet.
- Lock the two attaching screws (18) of the electromagnet in this configuration.
- Cut off the power supply of the electromagnet.
- Loosen the attaching screw (62) of out-of-center stop (63) of the drive lever.
- Adjust the eccentric to obtain 0.4 to 0.6 mm cleareance between the drive lever and the bottom of the ratchet tooth.
- Lock attaching screw (62) of the out-of-center stop.
- Remove the adjusting shims.



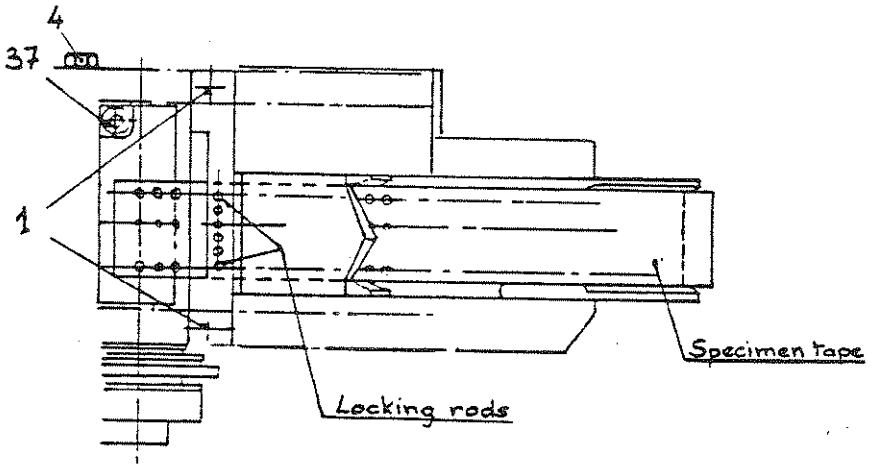
TAPE GUIDE

- Assemble by following the disassembly procedure in the opposite order, but without locking the attaching screw (1).

ADJUSTMENT OF PUNCH PITCH

- Make sure that screw (37) locking the sprocket wheel is loose and visible.
- Using another TAPE PUNCH, punch approximately 200 mm of "Z" combination and make sure that the tape obtained complies with specification DIN66016.
- Energize the motor at 24 V d-c.
- Insert the specimen tape through the punch block and over the sprocket wheel.

- Place two locking rods with a diameter of 1.80 ± 0.02 mm in the end holes of the punch block and in the punched specimen tape.
- Move the tape guide so that the punched tape moves freely without unilateral friction or any fault in alignment.
- Lock the two attaching screws (1) of the tape guide.
- Insert the pins of the sprocket wheel in the sprocket holes of the specimen tape.
- Hold the tape engaged over the pins of the sprocket. CAUTION : Do not apply traction or translation movement to the tape while holding it on the sprockets ; the holes placed in the punch block would become oval thus making the tape unserviceable for this adjustment.
- Lock attaching screw (37) of the sprocket wheel.
- Remove the specimen tape.
- Cut off the power supply of the TAPE PUNCH motor.



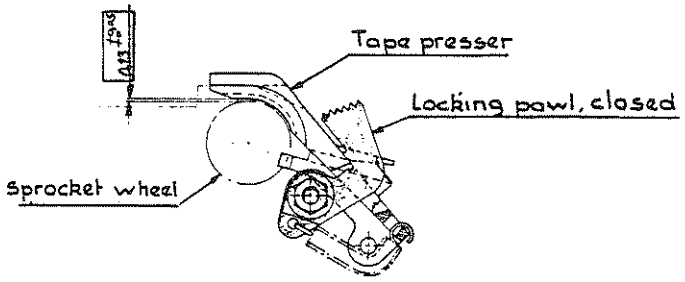
NOTE : This adjustment can be made using the corresponding tools : 2 rods, 1.8 mm diameter, and 27 338 121-3 .

TAPE PRESSER

- Assemble by following the disassembly procedure in the opposite order without locking nut (4) attaching the locking pawl.
- Make sure the tape presser shaft does not touch the drive electromagnet.

ADJUSTMENT OF TAPE PRESSER - SPROCKET WHEEL CLEARANCE

- Open the tape presser.
- **Insert mylar tape (27 356 417-2), sprocket holed :**
  - . length : approximately 200 mm
  - . width : 17.4 mm
  - . thickness : between 0.15 mm and 0.17 mm
- Close the tape presser.
- Insert a 0.05 mm shim between the tape presser and the lock.
- Press the lock.
- Lock the attaching nut (4) of the locking pawl.



CHAD GUIDE

- **Make sure there is no chads in the punch block.**
- Assemble by following the disassembly procedure in the opposite order.

TESTING OF PUNCH PITCH

- Assemble the TAPE PUNCH on a unit.
- Make at least 60 "letter" punchings.
- On the tape, make sure that the intervals between the center-to-center distances of the end holes of any sequence whatever of :
  - . 10 pitches is between 25.15 and 25.65 mm
  - . 50 pitches is between 126.1 and 127.9 mm

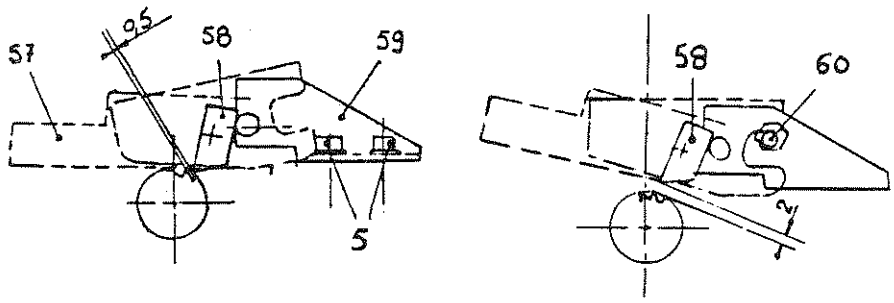
  IF EITHER OF THE TWO MEASUREMENTS IS OUT OF TOLERANCES :
  - . remove THE TAPE PUNCH from the unit,
  - . remove the chad guide,
  - . remove the tape presser,
  - . RE-ADJUST THE PUNCH PITCH.

PUNCH BACK SPACER

- Assemble by following the disassembly procedure in the opposite order, without locking the two attaching screws (5).

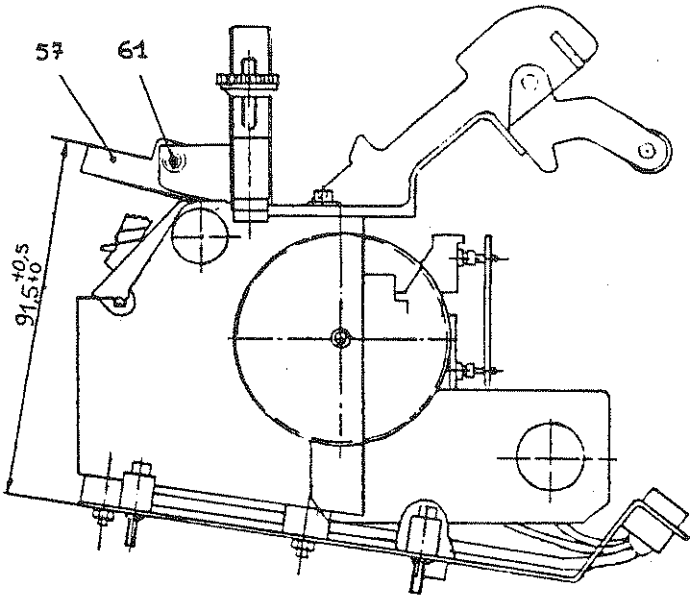
ADJUSTMENT OF PUNCH BACK SPACER

- Energize the motor at 24 V.
- Place a 0.5 mm shim under the ratchet tooth.
- Press lever (57) and, by translating assembly (59), bring pawl (58) to abut against the shim.
- Lock the two attaching screws (5) of assembly (59).



- Release eccentric (60) and, with the eccentric moved forward, bring the pointer of pawl (58) to bear against a 2 mm shim placed over the tip of the tooth.
- Lock eccentric (60).
- Cut off the power supply of the motor.

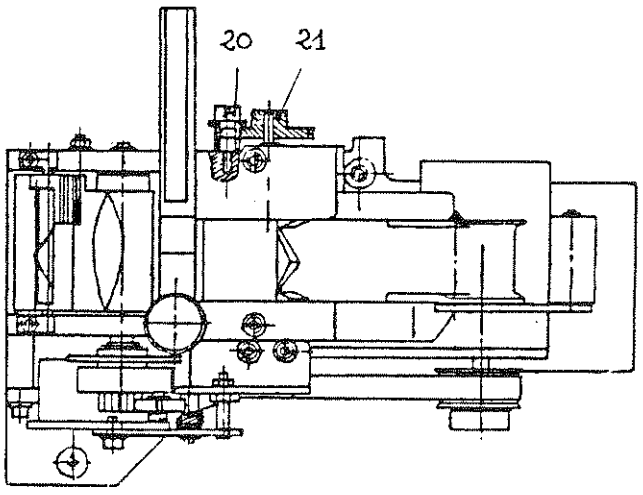
- Release screw (61) and, through the hole, move lever (57) to obtain 96.5 mm to 98 mm between the point of the lever and the bottom of the TAPE PUNCH base plate.



- Lock screw (61).

ANTI-BLACKLASH CLUTCH (21)

- Install anti-blacklash clutch (21).
- Install locking screw (20) and its spacer in the slot of anti-backlash clutch (21), provided for this purpose.
- Lock screw (20).



6.3 FINAL TESTING

- Repeat the initial testing described previously.

SETTING AND RETAINING OF LOWER NEUTRAL POINT

In the paragraph entitled "Assembly - Adjustment" mention is made of the lower neutral point of the TAPE PUNCH. Proceed as follows :

- remove electronic board (12) from the synchronization device after gripping the lock of each support (13) (see "Disassembly" of ELECTRICAL ASSEMBLY),
- remove retaining screw (20) with its spacer and remove anti-backlash clutch (21) (see "Disassembly" of CONNECTING ROD ASSEMBLY),
- using the shaft of the 90-tooth pulley, bring the eccentric to the lower neutral point,
- check that the setting is correct by moving the 90-tooth pulley each side of the setting point.

The adjustment of this lower neutral point is facilitated by the use of tool 27 338 119-3.

7 – TAPE STORE

7.1 INITIAL TESTING

- Visually check the condition of the mechanical parts.
- Manually check the operation of the parts.

7.2 ASSEMBLY - DISASSEMBLY

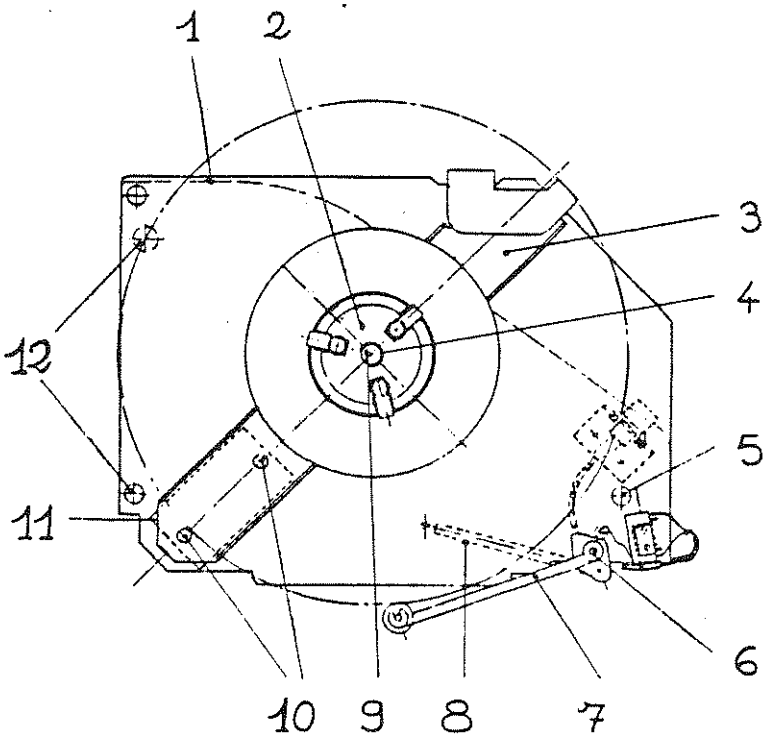
1) Disassembly

GUIDE (3)

- Remove locking ring (4) and hub (2).
- Remove the two attaching screws (10) and plate (11).
- Remove guide (3).

COUNTER PLATE (1)

- Unhook and remove spring (8).
- Remove locking ring (6) and tape low lever (7).
- Remove three attaching screws (5) and (12).
- Remove counter plate (1).

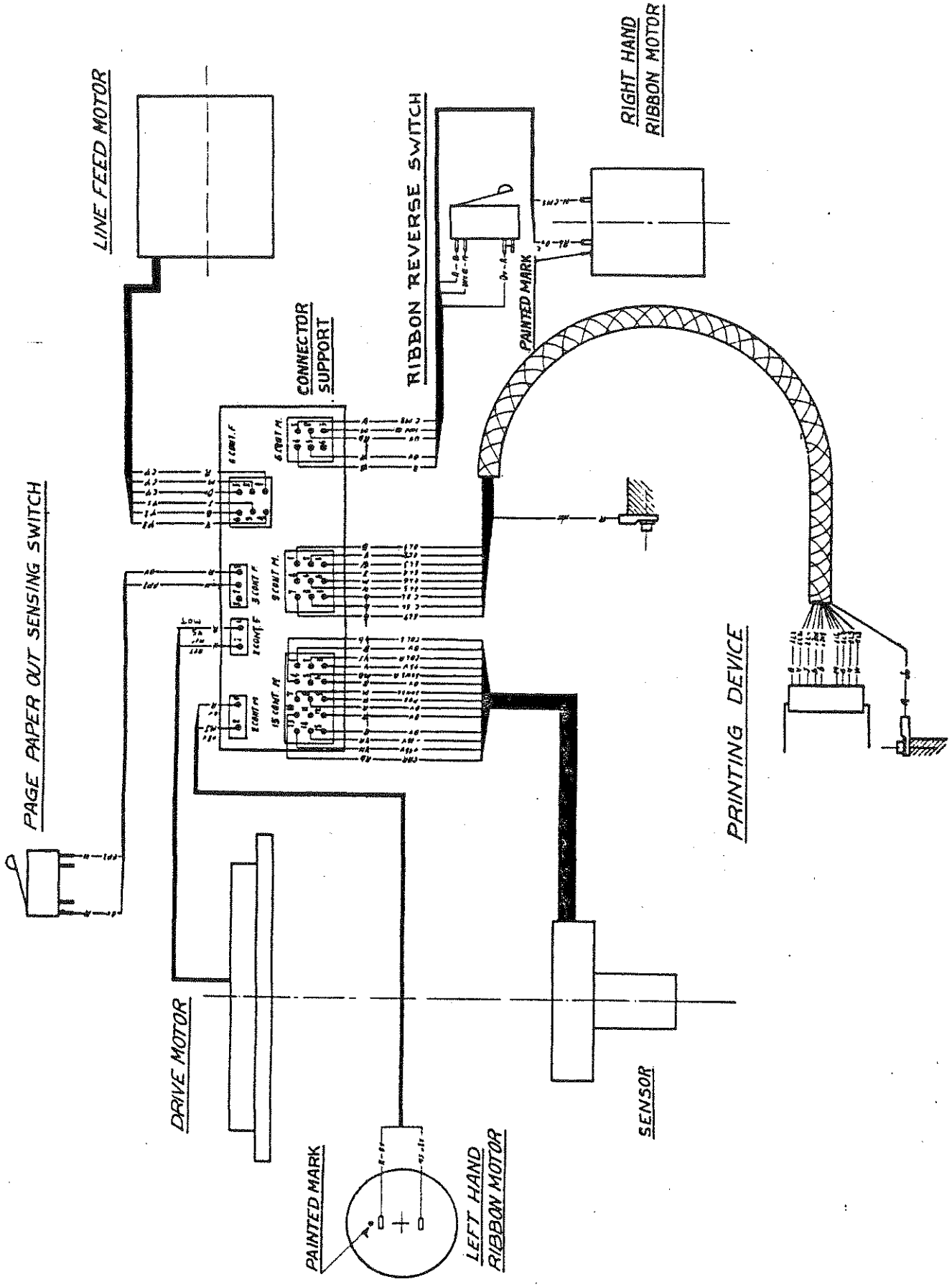


2) Assembly - Adjustment

- Assemble by following the disassembly procedure in the opposite order while lightly lubricating shaft (9) of hub (2).

7.3 FINAL TESTING

- Repeat the initial testing described above.


LINE FEED MOTOR
RIGHT HAND RIBBON MOTOR
RIBBON REVERSE SWITCH
CONNECTOR SUPPORT
PAINTED MARK
PAGE PAPER OUT SENSING SWITCH
PRINTING DEVICE
DRIVE MOTOR
SENSOR
PAINTED MARK
LEFT HAND RIBBON MOTOR

8 – PRINTER

8.1 INITIAL TESTING

1) Static testing

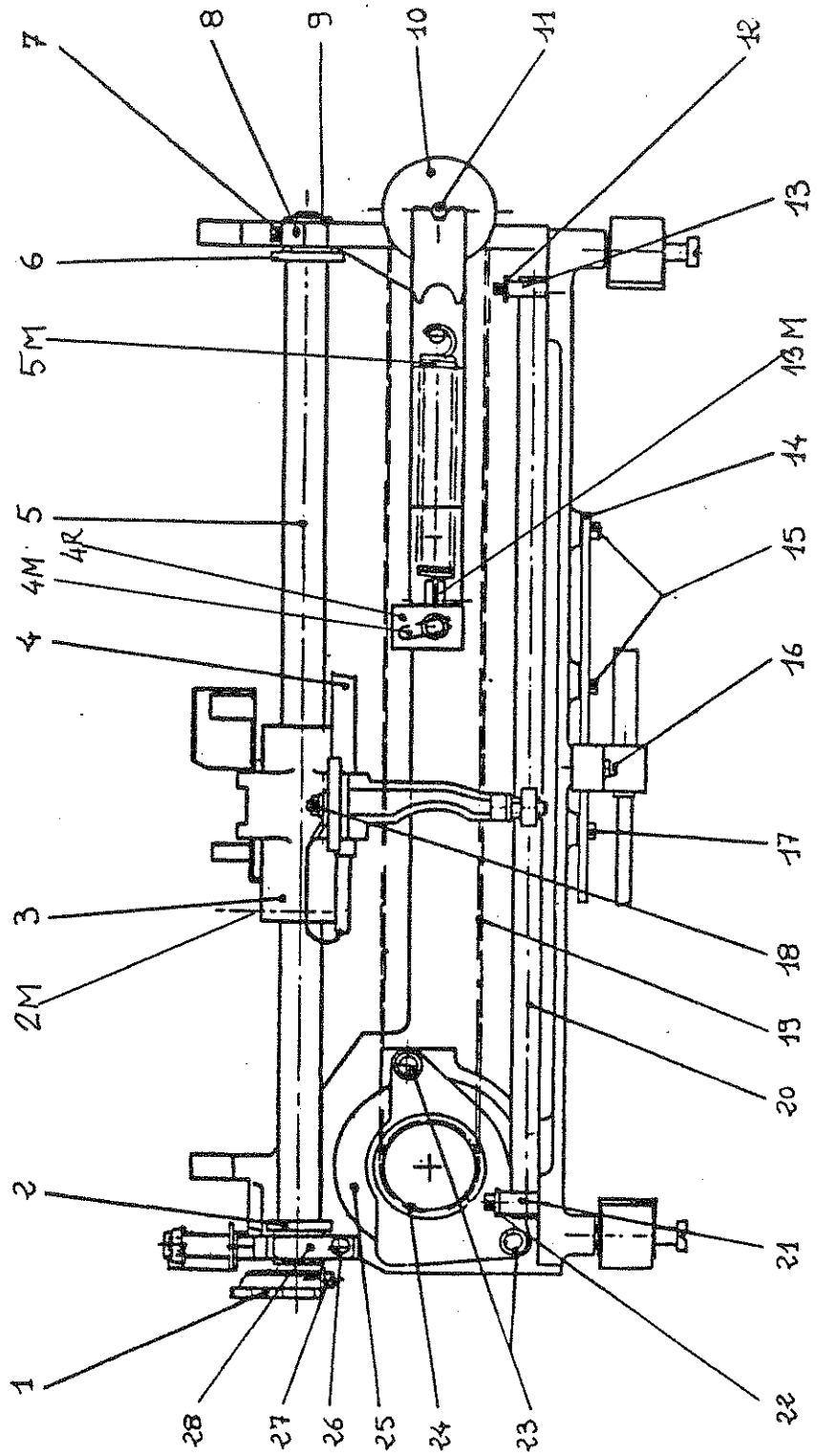
- Visually check the condition of the mechanical parts.
- Manually test the mechanical operation of all the parts.
- Check the continuity of the wiring, the movement of the switches, the operation of the motors and the inputs and outputs of the SENSOR, using an ohmmeter.

2) Dynamic testing

TESTING OF DRIVE MOTOR, CARRIAGE AND SENSOR

- Energize the SENSOR with + 15 V, - 15 V, + 5 V and 0 V.
- Load the "$\overline{\text{CAR}}$", "SENS L" and "COL L" outputs with a 3.9 KΩ résistance at + 5 V.
- Energize the DRIVE MOTOR with a 0 to + 12 V d-c power supply initially held at O V.
- Remove the belt (19).
- Gradually increase the voltage across the terminals of the DRIVE MOTOR until it moves very slowly and continuously.
- Check the signals supplied by the SENSOR ("$\overline{\text{CAR}}$", SENS L" and "COL L").
- Reverse the direction of movement and check once again the signal supplied by the SENSOR.
- Replace the belt and check that the movement of the carriage is free of friction points by checking that the current passing through the DRIVE MOTOR is more or less constant.

NOTE : "$\overline{\text{CAR}}$", "SENS L" and "COL L" signals phase relationship and voltages are indicated in the TECHNICAL DESCRIPTION, "SENSOR" paragraph.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11
12
13
6
5M
13M
14
5
4M
4R
15
4
16
17
3
18
2M
19
20
2
21
1
22
28
27
26
25
24
23

Testing of ribbon feed and reversal

- Set up the test connection using the "PIA IMP" board connected to the RIGHT HAND RIBBON and LEFT HAND RIBBON.
- Install a PRINTING DEVICE on the CARRIAGE with a ribbon.
- Energize the card with + 12 V, - 12 V, + 5 V and 0 V.
- Set the "$\overline{\text{Cde AV. RUB}}$" input to + 5 V through a 2.2 k resistor.
- Apply 0 V to the "$\overline{\text{Cde AV.RUB}}$" input ; the ribbon moves.
- Check the operation of reversal in both directions.
- Alternately set the "$\overline{\text{Cde AV. RUB}}$" input to 0 V and + 5 V to check the feed and stoppage of the ribbon.

8.2 DISASSEMBLY - ASSEMBLY - ADJUSTMENT

1) Disassembly

To remove the PRINTER modules, refer to the Field Maintenance Manual except as concerns the BASE ASSEMBLY described below.

CAUTION : During removal, do not loosen the painted screws, mainly items (12), (13), (20), (21), (22).

To disassemble a removed module, refer to the relative chapters of this document.

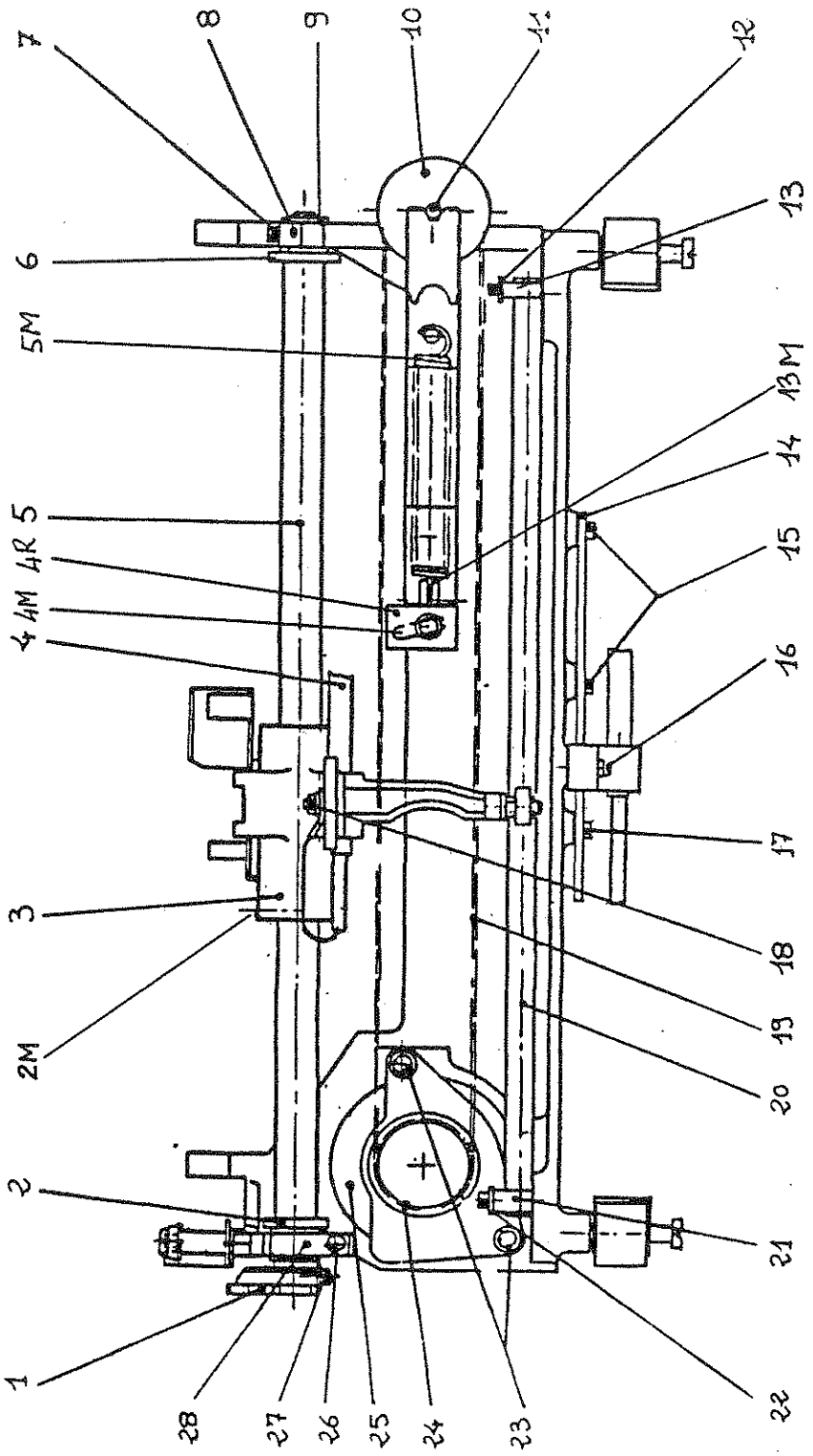
CAUTION : The PRINTING DEVICE, DRIVE MOTOR and SENSOR are not repairable in the workshop and must be returned to the factory.

BASE ASSEMBLY

- Remove all PRINTER modules (refer to the Field Maintenance Manual).
- Remove screws (15) and (17) and remove connector support (14).

CARRIAGE

- Remove screw (16) and remove sheath clamp.
- Loosen the screw (4 M) and release the stop (4 R).
- Tighten the spring slightly so that the pulley wheel (10) can be released.
- Take care of the pulley wheel (10) and its shaft (11) which are only held by the belt (19).


7
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9
10
11
12
13
6
5M
13M
14
5
4R
15
4M
4
16
17
3
18
19
2M
20
2
21
1
22
28
27
26
25
24
23

- Release the belt (19) from the pulley (24).
- Remove the spring (5M) taking care not to loose shaft (13 M).
- Remove screws (7) and (26) and clamps (8) and (28).
- Remove guide shaft (5) fitted with (1) (2) (3) (6) (9) (27).
- Disconnect CARRIAGE (3) from its guide shaft (5).
- Remove screw (18) and power supply cable (4).
- Remove the belt (19) by taking care to locate where the belt has been fixed on the carriage.
- Remove ribbon-guide after having removed the attaching screw (2 M).
- Detach the screws from the deformable body in order to install the ball sockets.
- Remove the other parts.

2) Assembly-Adjustment

CARRIAGE(3)

- Assemble by following the disassembly procedure in the opposite order.
- Install the fixing of the belt (19) on the CARRIAGE at the same location.

CAUTION : Final tightening of the deformable body of the ball sockets is to be accomplished when the CARRIAGE is in position on its guide shaft, to obtain free movement, without clearance on the shaft.

BASE ASSEMBLY

- Assemble by following the disassembly procedure in the opposite order.
- During assembly, lubricate the bearings, ball bearings and shafts lightly.

PRINTER UNIT

- Disassemble the printer unit and carry out any adjustments required as defined in the Field Maintenance Manual.

8.3 FINAL TESTING

- Repeat the tests described under "Dynamic Testing".

8.4 PRINTING HEAD

This module cannot be repaired in a workshop and must be returned to the factory.

8.5 SENSOR

This module cannot be repaired in a workshop and must be returned to the factory.

8.6 DRIVE MOTOR

This module cannot be repaired in a workshop and must be returned to the factory.

8.7 PAPER ADVANCE

8.7.1 Initial testing

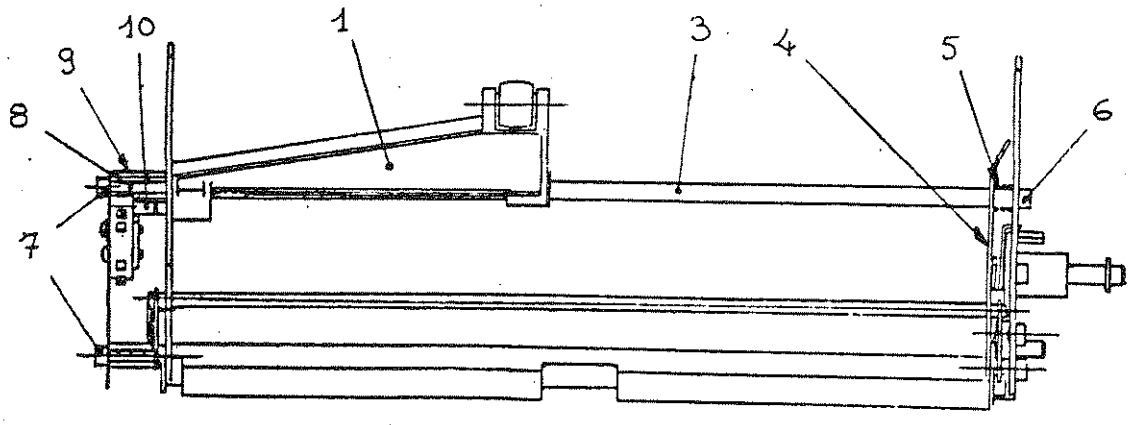
- Visually check the condition of the mechanical parts.
- Manually test the mechanical operation of the parts.

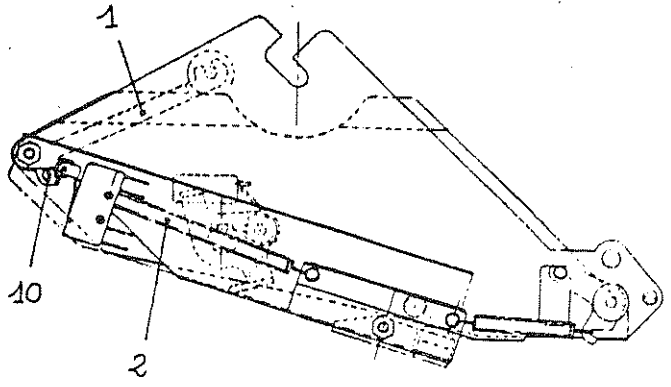
8.7.2 Disassembly - Assembly -Adjustment

1) Disassembly

PAPER LOW LEVER (1)

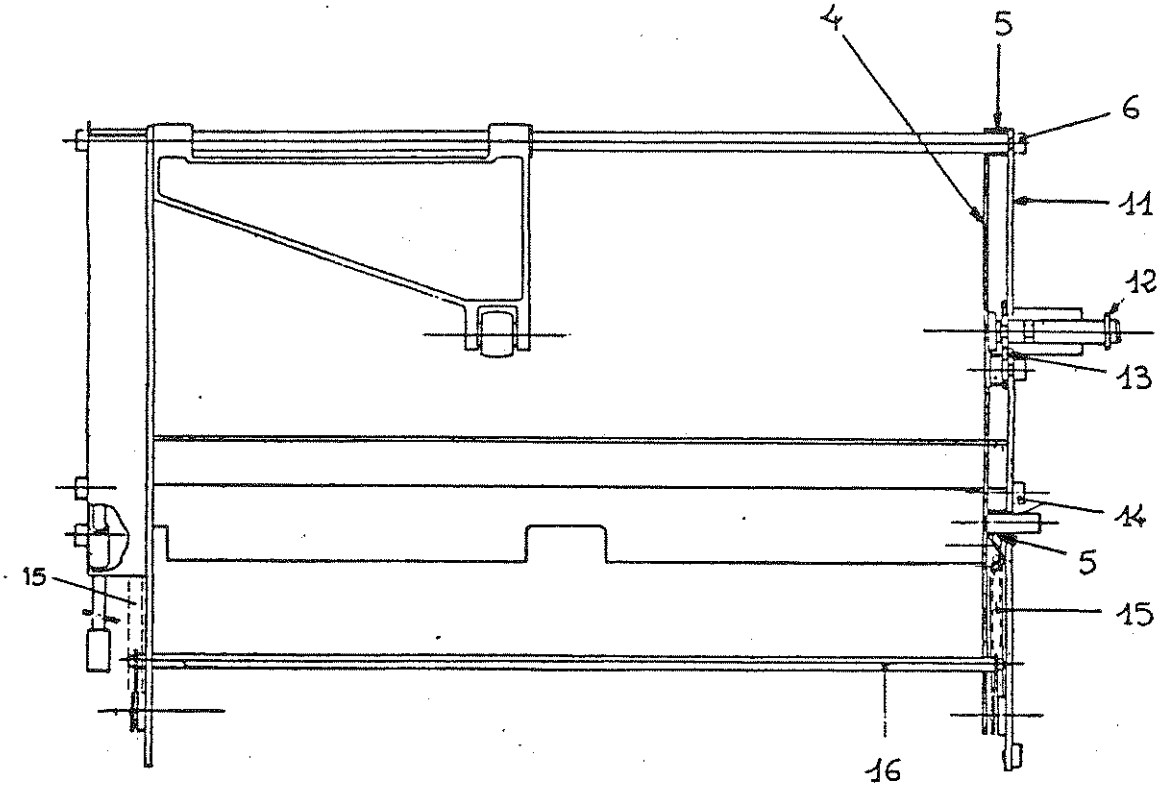
- Remove the two attaching screws (7) from the casing (9) and remove the latter.
- Remove the screw (6) securing the shaft (3) of the paper low lever (1).
- Unhook spring (2) from its attaching point (10) on paper low lever (1).
- Remove spacer (8).
- Release the paper low lever (1) and its shaft (3) taking care of compression spring (5) pushing against moving flange (4).
- Remove the paper low lever (1) by releasing it from its shaft (3).





COMPRESSION SPRINGS (5)

- Unhook return springs (15) of the tension bar (16).
- Remove locking ring (12).
- Remove the 3 screws (6) and (14) attaching flange (11).
- Release flange (11) by operating locking lever (13) of moving flange (4).
- Remove the compression springs (5) from their shaft.



2) Assembly

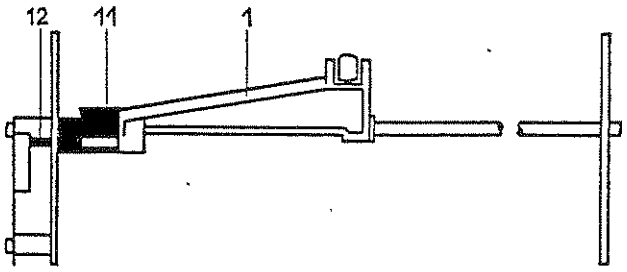
- Follow the disassembly procedure in the opposite order.
- Before assembling the compression springs (5), lubricate lightly the lock shaft of moving flange (4).

8.7.3 Final testing

- Manually check the mechanical operation of the parts.

8.7.4 Complementary data

PAPER LOW LEVER (1) with push (11)



1) Disassembly

- Remove the two attaching screws (7) from the casing (9) and remove the latter.
- Remove the screw (6) securing the shaft (3) of the paper low lever (1).
- Unhook spring (2) from its attaching point (12) on the push (11) of the paper low lever (1).
- Remove spacer (8).
- Release the push (11), the paper low lever (1) and its shaft 3) taking care of compression spring (5) pushing against moving flange (4).
- Remove the push (11) by releasing it from its shaft (3).
- Remove the paper low lever (1) by releasing it from its shaft (3).

2) Assembly

- Follow the disassembly procedure in the opposite order.

8.8. PRESSURE ROLLERS

8.8.1 Initial testing

- Visually check the condition of the mechanical parts.
- Manually test the mechanical operation of the parts.
- Check the pressure rollers adjustments, i.e. :

  A = 24.9 mm to 25.1 mm

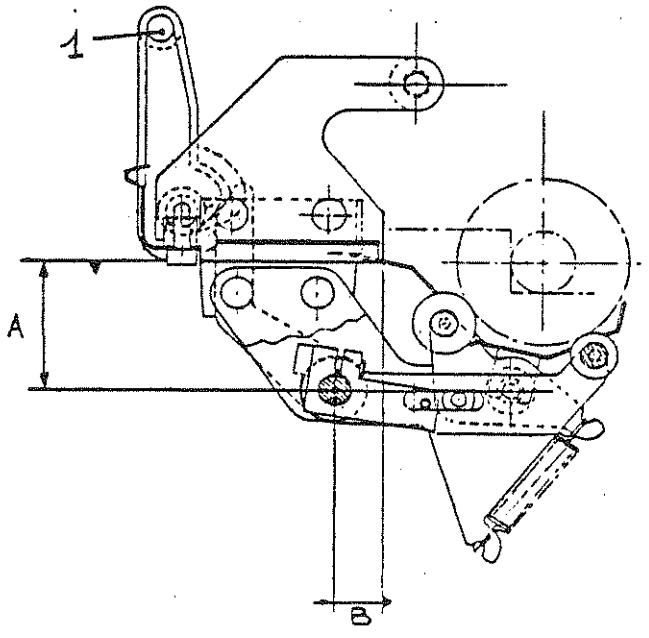
  B = 8.9 mm to 9.1 mm

  Refer to the following drawing and check both sides of the module.

  NOTE 1 : The side marked " ▲ " is the reference surface.

  NOTE 2 : The check can be made using the tool 23 106 762-7.

- Assemble the module on a PRINTER and check that the PRESSURE ROLLERS clear or press against the PLATEN depending on the position of control lever (1).

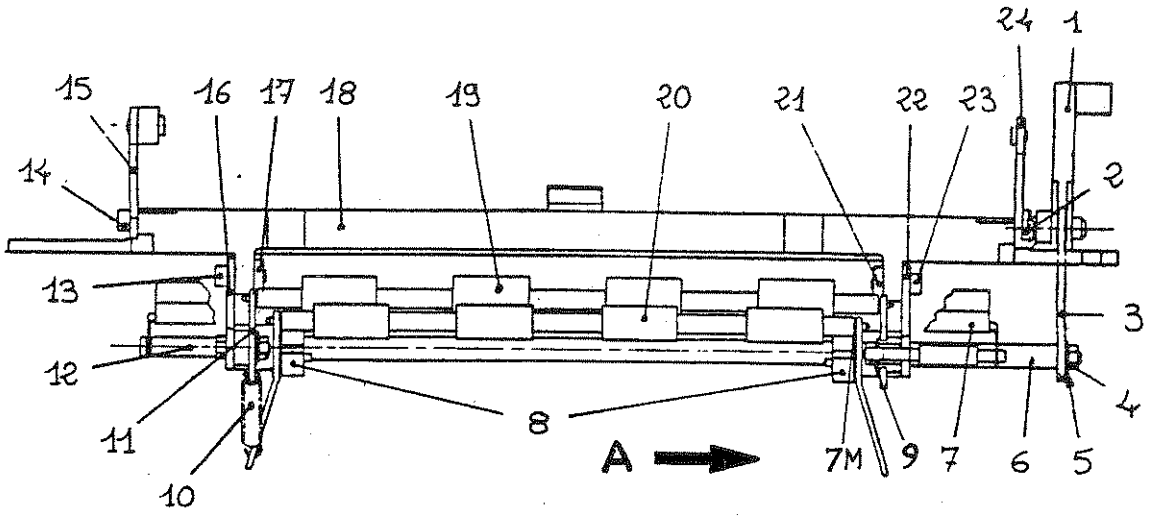


8.8.2 Disassembly - Assembly -Adjustment

1) Disassembly

CONTROL LEVER (1)

- Press spreader lever (3) of PRESSURE ROLLERS (19) and (20) to clear the groove of control lever (1).
- Release control lever (1) from its pivoting shaft.



NOTE : See at end of paragraph the pressure rollers replacement.

PIVOTING SHAFF (6) OF PRESSURE ROLLERS (19) AND (20)

The assembly :

- Remove deflector, tear-blade and holding clamps of the platen.
- Remove the deformable hub of the line feed motor pulley.
- Release belt at the line feed motor level.
- Remove platen.
- Remove nut (4) and washer (5).
- Release spreader lever (3) of PRESSURE ROLLERS (19) and (20).
- Loosen the clamps (8).
- Release pivot shaft (6) of PRESSURE ROLLERS (19) and (20) taking care of the parts which come free.

PRESSURE ROLLERS (19) AND (20)

- Remove pivoting shaft (6) of PRESSURE ROLLERS (19) and (20).
- Unhook the two springs (10).
- Remove the smaller diameter PRESSURE ROLLER (20).
- Remove nut (9) securing shaft (12) and its washer.
- Remove shaft (12) and PRESSURE ROLLER (19) pivoting arm (11).
- Release and remove large diameter PRESSURE ROLLER (19).

BASE (18)

- Remove control lever (1).
- Remove the two attaching screws (14) and remove the support (15).
- Remove the two attaching screws (2) and remove the support (24).
- Remove the two attaching screws (13) and plate (17) while holding flange (16) in position.
- Remove both attaching screws (23) and remove plate (21) while holding flanges (16) and (22) in position.
- Remove the pivoting assembly of PRESSURE ROLLERS (19 and 20) WITHOUT LOOSENING OR REMOVING ANY OF ITS PARTS.
- Remove base (18).

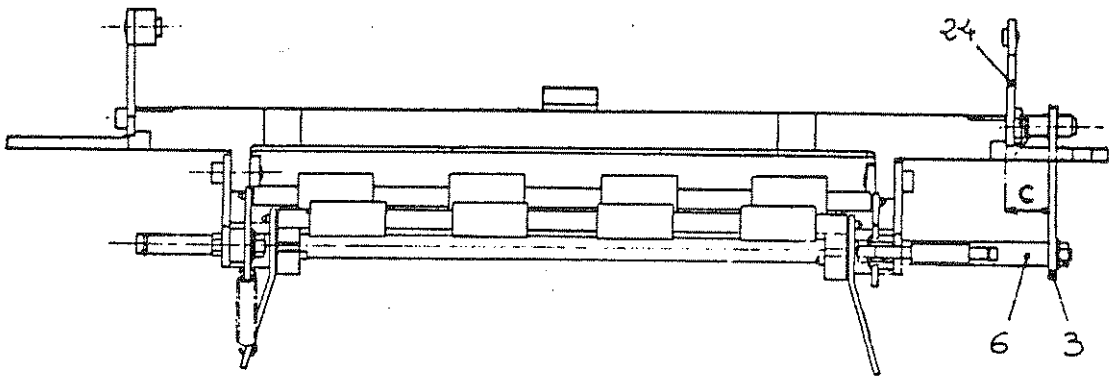
2) Assembly - Adjustment

CONTROL LEVER (1)

- Assemble the control lever in the same order as for disassembly.

PIVOTING SHAFT (6) OF PRESSURE ROLLERS (19 AND 20)

- Assemble by following the disassembly procedure in the opposite order, but :
  - do not tighten clamps (8),
  - do not fit channel (7) and control lever (1),
  - lubricate shaft (6), the shafts of PRESSURE ROLLERS (19) and (20) and the pivoting points.
- Adjust the pressure rollers spreader lever (3) :
  - assemble the PRESSURE ROLLERS on a without platen,



  - move pivoting shaft (6) of the PRESSURE ROLLERS to obtain a dimension (C) of 11 to 12 mm between the inner surface of flange (24) and the inner surface of PRESSURE ROLLERS spreader lever (3),
  - do not tighten the clamps (8) and make sure the dimension does not change.

- Adjust the PRESSURE ROLLERS :
  - with the PRESSURE ROLLERS still assembled on the PRINTER,
  - install control lever (1),
  - fit the PLATEN on the PRINTER,
  - make sure that all the PRESSURE ROLLERS bear on the PLATEN,
  - make sure that the previous adjustment size has not changed,
  - tighten clamps (8),
  - operate control lever (1) and check that the PRESSURE ROLLERS clear the PLATEN along its entire length.
    IF NOT, CARRY OUT THE ADJUSTMENTS IN FULL AGAIN.
  - install channel (7).

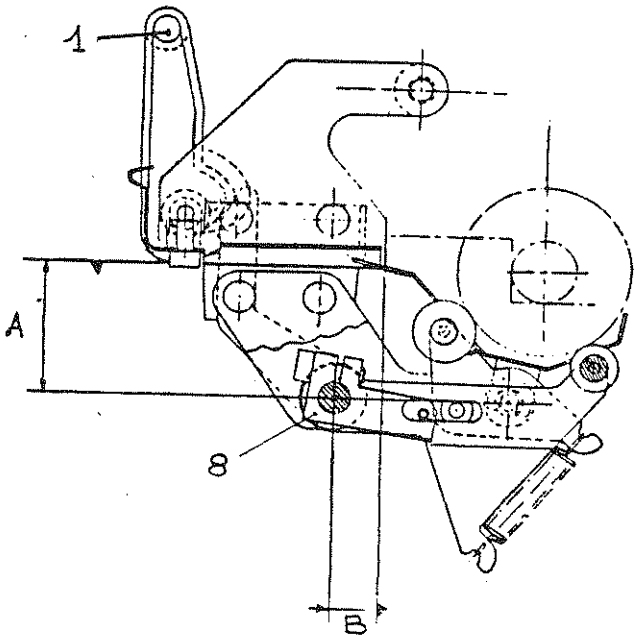
NOTE : These adjustments can be made using the corresponding tools (23 106 762-7).

- PRESSURE ROLLERS (19) AND (20)

- Assemble by following the disassembly procedure in the opposite order.

CASTING (18)

- Assemble by following the disassembly procedure in the opposite order, but :
  - do not tighten attaching screws (13) and (23),
  - do not fit control lever (1).
- Carry out the ADJUSTMENT OF THE FLANGES :



  - ensure that dimension (A) is 24.9 to 25.1 mm and dimension (B) 8.9 to 9.1 mm,
  - install control lever (1).

8.8.3 FINAL TESTING

- Repeat the initial testing described above.

8.9 PLATEN

8.9.1 Initial testing

1) Static testing

- Visually check the condition of the mechanical parts.
- Manually test the operation of the parts.

2) Adjustment

- Using shims, check the 0.1 to 0.2 mm clearance between bushing (3) and spacer (12) (see Assembly-Adjustment).

8.9.2 Disassembly - Assembly - Adjustment

1) Disassembly

BUSHING (3)

- Remove locking ring (1) and washer (2).
- Remove bushing (3).

PLATEN (6)

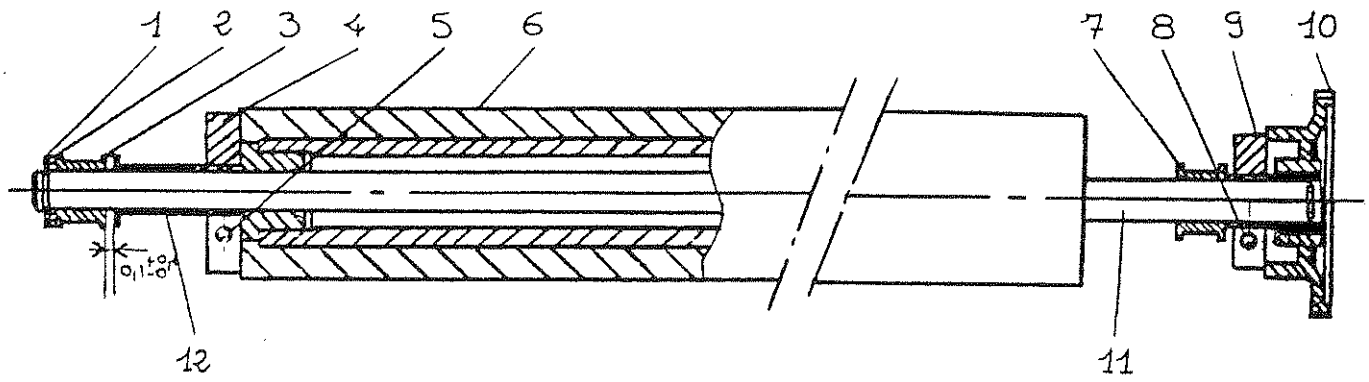
- Remove bushing (3).
- Remove spacer (12) and loosen screw (5) of clamp (4).
- Remove the PLATEN (6).

CAST 45-TOOTH PULLEY (10)

- Loosen screw (8) of clamp (9).
- Remove the 45-tooth pulley (10).

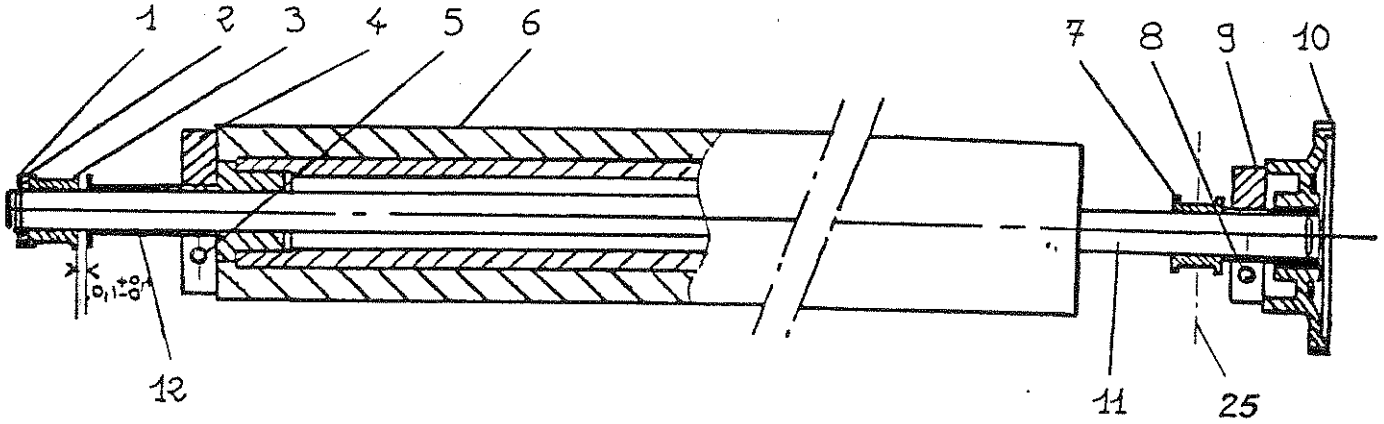
BUSHING (7)

- Remove 45-tooth pulley (10).
- Remove bushing (7).



2) Assembly - Adjustment

- Assemble by following the disassembly procedure in the opposite order.
- During the assembly of bushings (3) and (7), lubricate lightly shaft (11).
- During the assembly of the PLATEN (6) or of the 45-tooth pulley (10), adjust the clearance between bushing (2) and spacer (12) as follows :
  - . assemble the PLATEN on a PRINTER base,
  - . insert a 0.1 mm shim between bushing (2) and spacer (12),
  - . tighten screw (5) of clamp (4),
  - . bring the 45-tooth pulley (10) to bear against bushing (7),
  - . tighten screw (8) of clamp (9).



Replacement of PRESSURE ROLLERS (19) and (20) (See figure page 48)

- Remove assembly comprising : deflector, PLATEN holding clamps, strip and strip supports, by removing screws such as (25).
- Remove the clamp of the LINE FEED MOTOR pulley in order to release the belt.
- Remove the PLATEN.
- Remove channel (7).
- Apply a slight pressure on the shaft support of the front PRESSURE ROLLERS (19 and 20), at (7M) as indicated by arrow A, in order to release it.
- Loosen nut (9).
- Release the shaft of large diameter PRESSURE ROLLERS, proceeding in the same way as for the small diameter PRESSURE ROLLERS.

NOTE : This operation requires no adjustments.

8.9.3 Final testing

- Manually check the rotation of bushings (3) and (7), of washer (2) and of spacer (12).

8.9.4 Complementary data

8.9.4.1 PLATEN (Assembly reversed)

1) Disassembly

BUSHING (2)

- Remove locking ring (1).
- Remove bushing (2).

PLATEN (6)

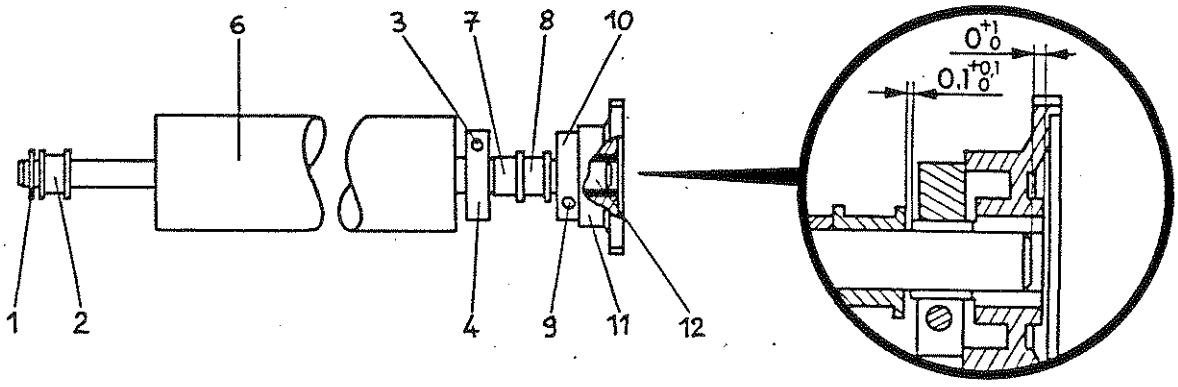
- Remove bushing (2).
- Loosen screw (3) of clamp (4).
- Remove the platen (6).

CAST 45 - TOOTH PULLEY (11)

- Loosen screw (9) of clamp (10).
- Remove the 45-tooth pulley (11).

BUSHING (8)

- Remove the 45-tooth pulley (11).
- Remove bushing (8) and spacer (7).



2) Assembly - Adjustment

- Assembly by following the disassembly procedure in the opposite order.
- During the assembly of bushing (2) and (8), lubricate lightly shaft (12).
- During the assembly of the 45-tooth pulley (11), adjust the clearance between bushing (8) and the 45-tooth pulley (11) as follow :
  . assemble the PLATEN on a PRINTER base,
  . insert a 0.1 mm shim between bushing (8) and the 45-tooth pulley (11),
  . tighten screw (3) of clamp (4),
  . tighten screw (9) of clamp (10).

8.9.4.2 PLATEN (Moulded around the shaft)

1) Disassembly

BUSHING (2)

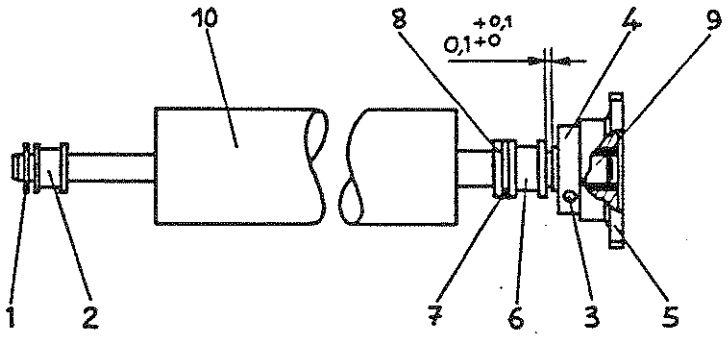
- Remove locking ring (1).
- Remove bushing (2).

CAST 45-TOOTH PULLEY (5)

- Loosen screw (3) of clamp (4).
- Remove the 45-tooth pulley (5).
- Remove the bushing (6), the washer (7) and the locking ring (8).

PLATEN (10)

- Remove bushing (2).
- Remove 45-tooth pulley (5).

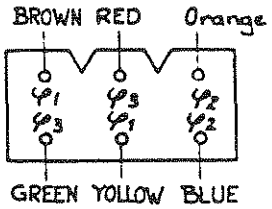


2) Assembly - Adjustment

- Assembly by following the disassembly procedure in the opposite order.
- During the assembly of bushings (2) and (6), lubricate lightly shaft (9).
- During the assembly of the 45-tooth pulley (5), adjust the clearance between bushing (6) and the 45-tooth pulley (5) as follow :
  . assemble the PLATEN on a PRINTER base,
  . insert a 0.1 mm shim between bushing (6) and the 45-tooth pulley (5),
  . tighten screw (3) of clamp (9).

8.10 LINE FEED MOTOR

8.10.1 Initial testing



- Visually check the condition of the mechanical parts.
- Manually test the running of motor (5).
- Check the continuity of motor (5) windings using an ohmmeter :

The value read on the meter should be approximately 20Ω.

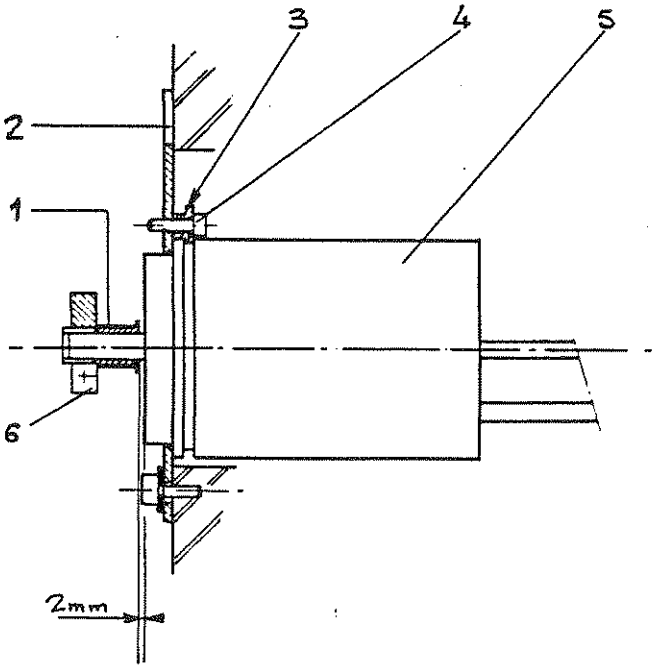
8.10.2 Disassembly - Assembly - Adjustment

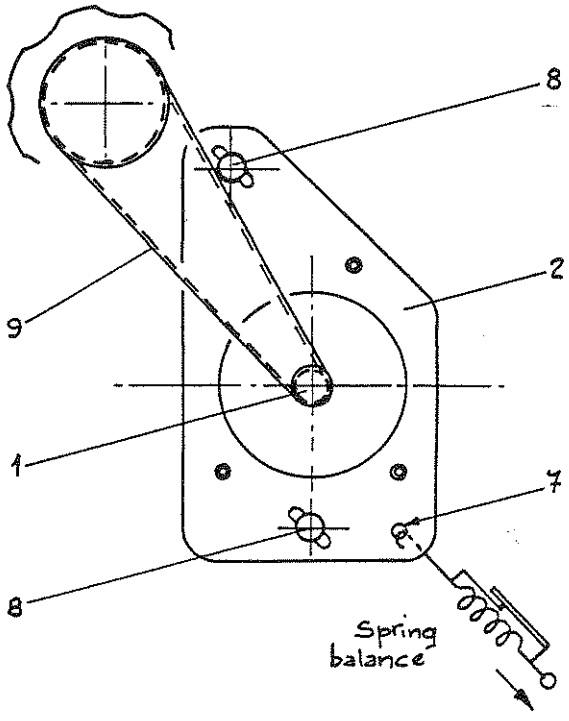
1) Disassembly

- Remove screws (4), clamps (3) and release support (2).
- Loosen clamp (6) and free the 15-tooth pulley (1) from the shaft of motor (5).

2) Assembly - Adjustment

- Assemble by following the disassembly procedure in the opposite order.
- Insert a 2 mm shim between motor (5) and 15-tooth pulley (1).
- Bring the 15-tooth pulley (1) to bear against the shim and lock clamp (6).
- Adjust the belt (9) tension at 3.5 to 4 N, using a 0 to 4 N strength spring balance, hooked in hole (7). Tighten screws (8).





8.11 RIBBON ASSEMBLY (LEFT)

8.11.1 Initial testing

1) Static testing

- Visually check the condition of the mechanical parts.
- Manually test the rotation of the LEFT HAND RIBBON loaded with a spool.
- Remove the spool and check the locking of plate (2).
- Check the continuity of the winding of motor (5). R = 6 Ω typ.

2) Testing of adjustment

- Check the adjustment of shaft (1) (see paragraph 2 "Assembly - Adjustment").

3) Dynamic testing

- Place a spool on plate (2) and lock it.
- Energize motor (5) by applying + 5 V d-c.
- Check that operation is correct.

8.11.2 Disassembly - Assembly - Adjustment

1) Disassembly

PLATE (2)

- Remove screw (10) and index (9).
- Remove plate (2) taking care of compression spring (3) which is no longer held in position.

RIBBON BASE (7)

- Remove plate (2) and remove the two attaching screws (4).
- Remove the left-hand ribbon base (7).

SHAFT (1)

- Remove plate (2) and two screws (8).
- Remove shaft (1).

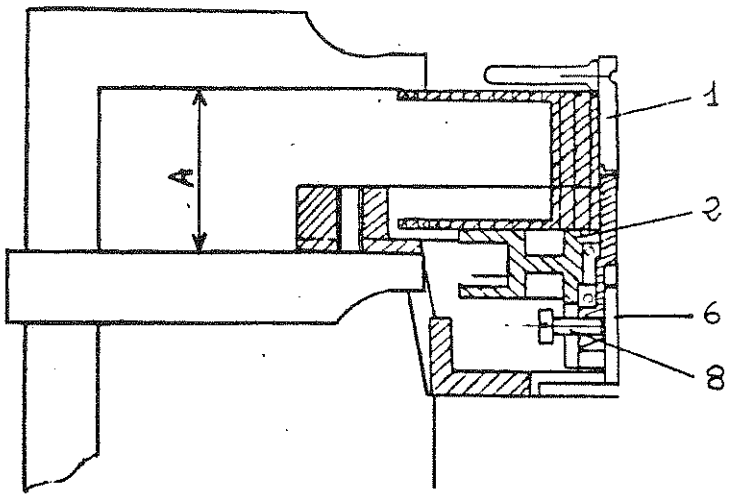
MOTOR (5)

- Remove plate (2), RIBBON base (7) and shaft (1).

2) Assembly - Adjustment

- Assemble by following the disassembly procedure in the opposite order.

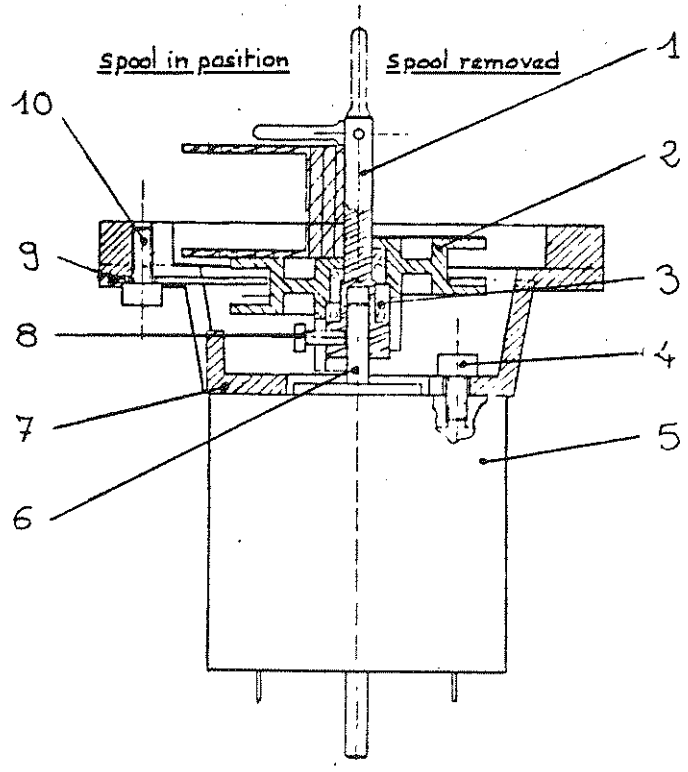
- During assembly of shaft (1), adjust its height.
- Place shaft (1) on motor shaft (6) without tightening screws (8).
- Place plate (2) and one spool in position.
- Using a caliper gauge (see figure below), adjust the height of the shaft to obtain a dimension (A) between 19.2 and 19.4 mm.
- Tighten screws (8) and assemble index (9) and screw (10).



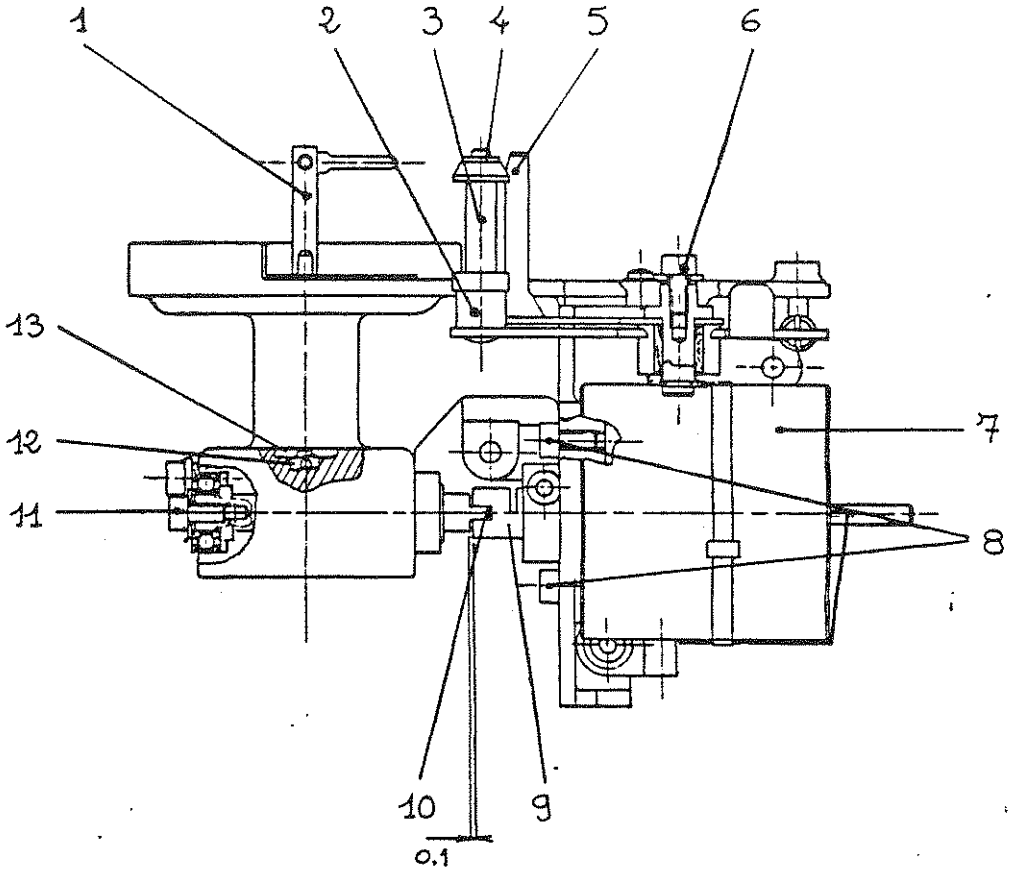
NOTE : this adjustment can be made using the tools 23 106 763-0, and 23 106 764-8.

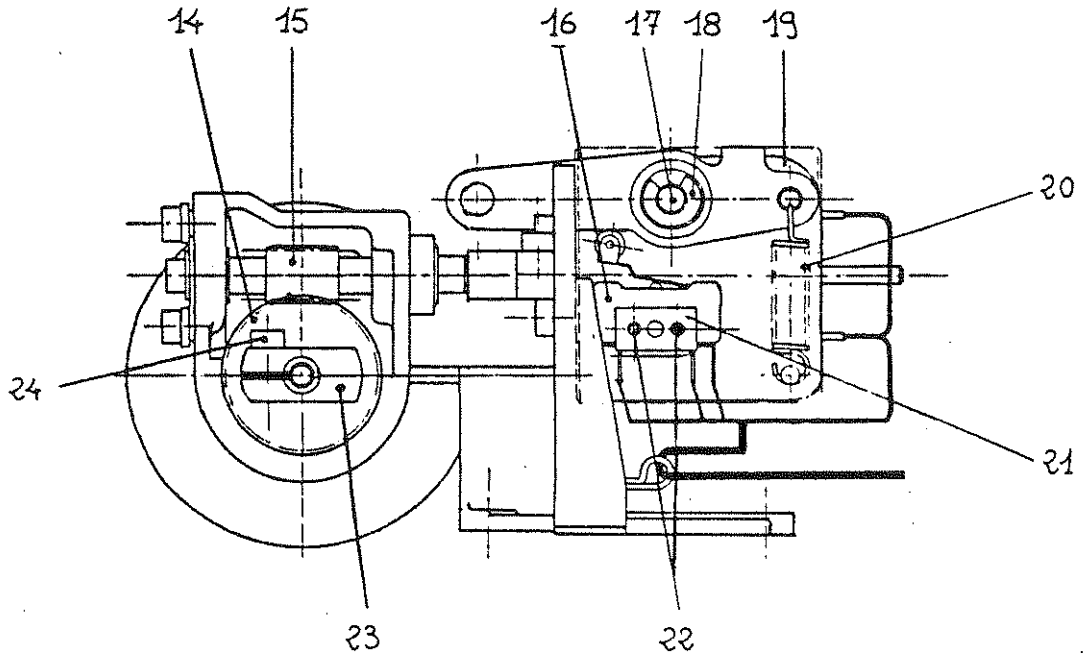
8.11.3 Final testing

- Repeat the dynamic test described above.



RIBBON ASSEMBLY (LEFT)





RIBBON ASSEMBLY (RIGHT)

8.12 RIBBON ASSEMBLY (RIGHT)

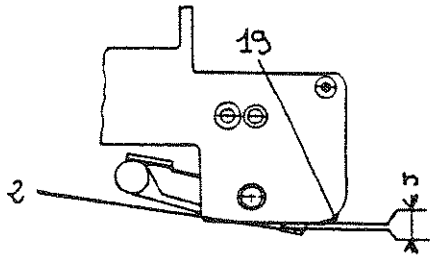
8.12.1 Initial testing

1) Static testing

- Visually check the condition of the mechanical parts.
- Manually test the mechanical operation of the reversal and drive system of control shaft (1).
- Check the operation of the ribbon reversal control switch (16) and the continuity of the drive motor winding (7) using an ohmmeter. R = 6 Ω typ.

2) Testing of adjustment

- Check the end play of wormscrew (15) by inserting a 0.1 mm shim between end (10) of worm screw (15) and drive assembly (9) .
- Check the operation of the ribbon reversal control switch (16) by inserting a 1.6 mm shim between plate (19) and lever (2).



NOTE : This adjustment can be made using the tool 23 106 765-1.

3) Dynamic testing

- Check the operation of the ribbon feed by applying + 12 V d-c across the terminals of motor (7).
- Reverse the voltage polarity to check the operation in the opposite direction.

8.12.2 Disassembly - Assembly - Adjustment

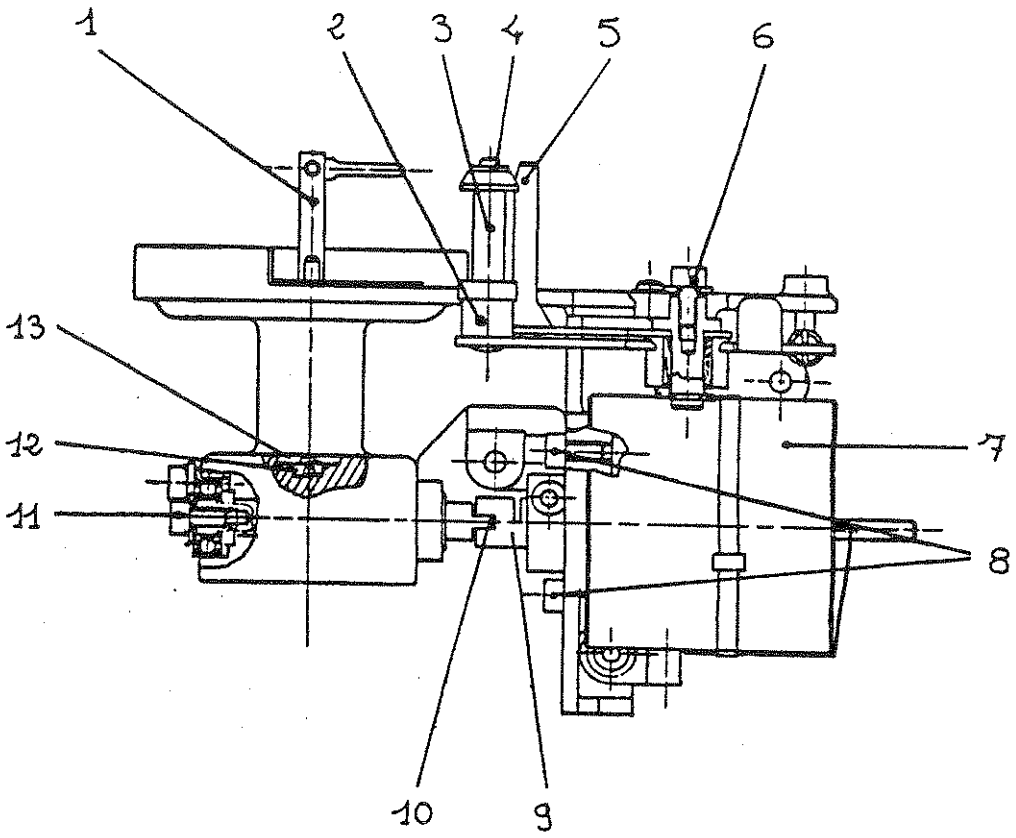
1) Disassembly

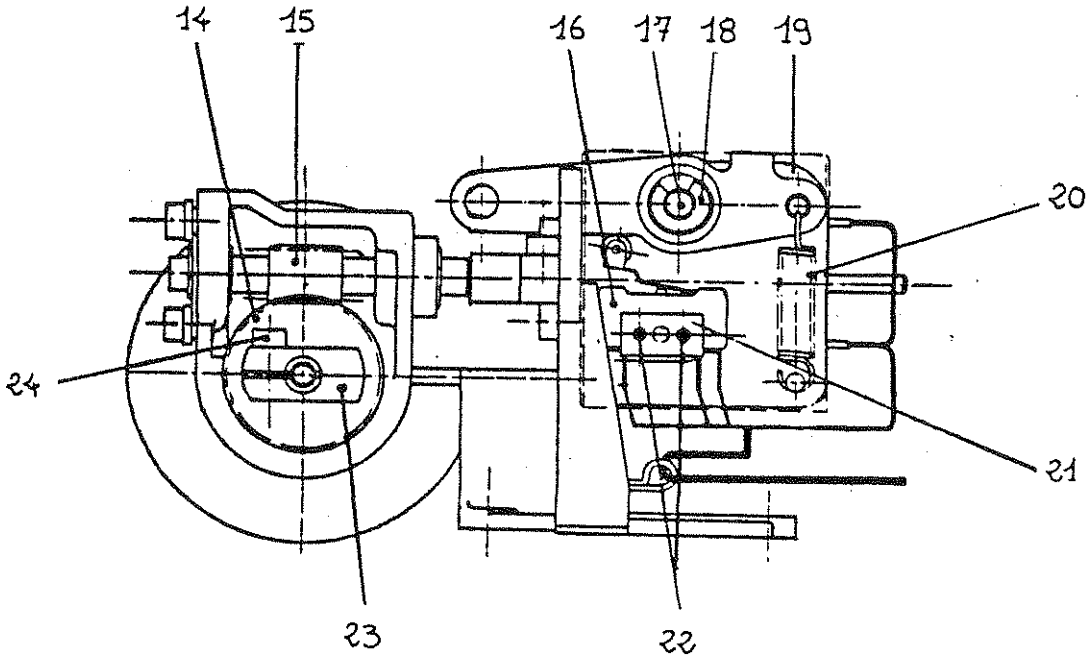
MOTOR (7)

- Remove the two attaching screws (8) and withdraw motor (7) from its housing.

WORM SCREW (10)

- Remove motor (7).
- Remove screw (11) and extract worm screw (10).





RIBBON ASSEMBLY (RIGHT)

SPIRAL WHEEL (14)

- Loosen screw (24) of clamp (23) and remove spiral wheel (14).

CONTROL SHAFT (1)

- Remove the spiral wheel (14).
- Remove screw (12) and plate (13).
- Remove control shaft (1).

TENSION (2) OR EYELET (5) DETECTOR LEVERS

- Remove motor (7) and traction spring (20).
- Remove screw (6) and remove the tension (2) or eyelet (5) detector levers.

ROLLER (3)

- Remove locking ring (4) and withdraw roller (3).

SHAFT (17)

- Remove the tension (2) or eyelet (5) detector levers.
- Remove locking ring (18) and withdraw shaft (17).

CONTROL SWITCH (16)

- Remove two screws (22) and tapped plate (21).
- Remove control switch (16).

2) Assembly - Adjustment

Assemble by following the dissasembly procedure in the opposite order.

CAUTION 1 : When replacing screw (12), take care not to constrict control shaft (1).

2 : When assembling drive assembly (9) on motor shaft (7), make sure that the motor brush pressure springs still operate, by pressing longitudinally against drive assembly (9).

- On reassembly, slightly lubricate control shaft (1), shaft (17) and worm screw (10).
- Check the axial clearance of worm screw (10) and the operation of the ribbon reversal control switch (16) as indicated in the paragraph : "Testing of Adjustment".

8.12.3 Final testing

- Repeat the "Dynamic Testing" described above.

9 – ELECTRONIC BOARDS

Electronic boards maintenance is facilitated through the use of extender boards.

9.1 "ALIMENTATION" BOARD

The dynamic testing of this board is carried out in the following order :

- testing of power supplies,
- testing of initialization,
- testing of DRIVE MOTOR amplifier.

9.1.1 Initial testing

- Visually check the condition of the components.

1) Testing of power supplies

Static testing

- Use an ohmmeter to check the order of magnitude of the following values :

CAUTION : The printed circuit board can be a double surface board.

Power supplies	Measurement terminal (see NOTE)	Value
+ 5 V ; 2,7 A	P2 2/6	> 3Ω
	P1 10/8	> 1MΩ
	P1 7/8	> 1MΩ
+ 15 V ; 400 mA	P2 9/5	> 50Ω
	P2 5/10	> 50Ω
- 15 V ; 200 mA	P1 6/5	> 1MΩ
	P1 4/3	> 1MΩ
30 V ; 500 mA	P3 16/19	> 500Ω
	P1 2/1	> 1MΩ

Dynamic testing

- If the measured values are correct, make the TRANSFORMER, "ALIMENTATION" board and POWER AMPLIFIER connection.
- Apply voltage and check the power supply voltages off-load using a voltmeter.
- Switch the equipment off.

NOTE : (P2-2/6) corresponds to the measurement to be made across terminal (2) with respect to terminal (6) of connector (P2).

- Successively connect the load resistor of each power supply (see table below) and check the output voltage.

Power supply	Load resistor
5 V ; 2,7 A	R = 2Ω .P = 15 W
+ 15 V ; 400 mA - 15 V ; 200 mA	R = 40Ω .P = 10 W R = 75Ω .P = 5 W
30 V ; 500 mA	R = 60Ω .P = 15 W

- If the power supplies are correct, disconnect the set-up.

2) Testing of initialization

Static testing

- Check the components of the initialization section using an ohmmeter.
- Check that all the terminals (1-7) and (14-8) of relay (K1) are short-circuited.

Dynamic testing

- Make the TRANSFORMER, "ALIMENTATION" board and POWER AMPLIFIER connection.
- Apply voltage to the equipement.
- Check the power supplies of the various integrated elements.
- During initialization, check that (1-7) and (14-8) terminals are short-circuited.
- With an oscilloscope, observe $\overline{RES}$ signal at (P2-11) : at initialization $\overline{RES}$ signal is at "0" level and goes up to "1" level 50 to 100 ms later.
- Check that terminals (1-7) and (14-8) are no longer short-circuited.
- If the initialization circuit is correct, disconnect the set-up.

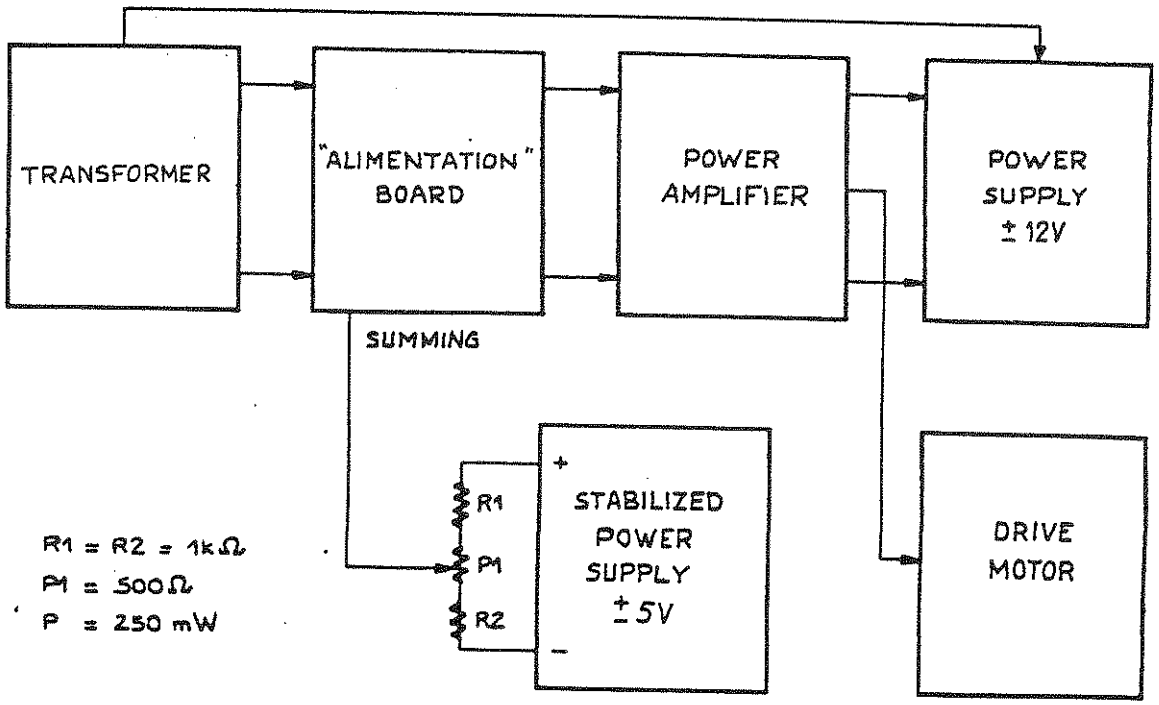
3) Testing of DRIVE MOTOR amplifier

Static testing

- Check the components of the amplifier section of the DRIVE MOTOR using an ohmmeter.

Dynamic testing

- Connect as shown on the next page.



- Apply voltage to the equipment.
- Apply 0 V to the input of summing circuit (P2-1) : the DRIVE MOTOR does not run.
- Connect the stabilized power supply (+ 5 V and - 5 V) and bring the potentiometer to abut in one direction : the DRIVE MOTOR runs.
- Bring the potentiometer to abut in the other direction : the DRIVE MOTOR turns in the opposite direction.

9.1.2 Disassembly - Assembly

- Replace the defective part(s) making sure that the outputs are not bent too close to their body during assembly.

9.1.3 Final testing

- Test as indicated in the first paragraph.

9.2 "ADAPTATION" BOARD

- Refer to the technical document "ADAPTOR SYSTEM"

9.3 OTHER ELECTRONIC BOARDS

- For testing and trouble shooting of electronic boards, refer to the UTILIZATION MANUAL of the PORTABLE MAINTENANCE EQUIPMENT EMP 2.
- For programming the answer-back code in the answer-back code memory, refer to the UTILIZATION MANUAL of the PORTABLE MAINTENANCE EQUIPMENT EMP 3.

10 – POWER SUPPLY

10.1 MAINS FILTER AND LIGHTNING ARRESTOR "PARAFOUDRE" BOARD

10.1.1 Initial testing

- Visually test the condition of the parts.
- Use an ohmmeter to check that the parts are not cutoff or short-circuited.

10.1.2 Assembly - Disassembly

- Replace the defective part(s).

10.1.3 Final testing

- Test as indicated in the first paragraph.

10.2 TRANSFORMER

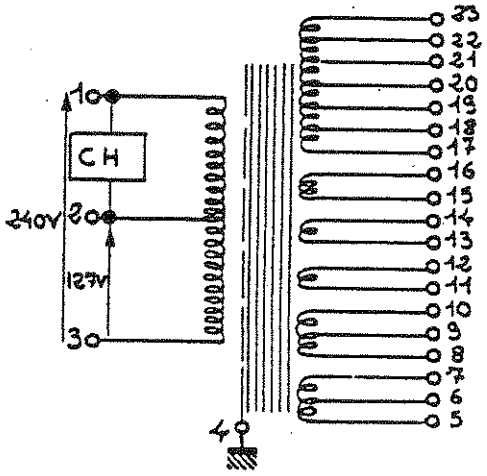
1) Static testing

- Visually check the condition of the TRANSFORMER.
- Check the continuity of the windings according to the following diagram, using an ohmmeter.
- Check that the windings are not short-circuited.

2) Dynamic testing

- Energize the TRANSFORMER and check the output voltages off-load.

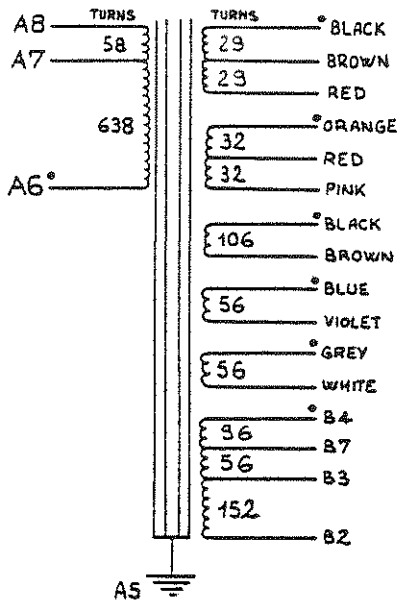
a) Transformer «SAGEM»



Measurement Point	Typical Resistance	Typical Voltage
6/7	0.07 Ω	10.6 V
6/5	0.07 Ω	10.6 V
9/10	0.1 Ω	11.8 V
9/8	0.1 Ω	11.8 V
11/12	0.7 Ω	20.7 V
13/14	1.7 Ω	20.7 V
15/16	0.6 Ω	39.6 V
20/22	15 Ω	56.8 V
20/18	15 Ω	56.8 V
20/17	NOT USED	NOT USED
20/19		
20/21		
20/23		

NOTE : Terminals (1) to (23) are marked on the winding of the TRANSFORMER. The hour counter (CH) is wired to terminals (1) and (2) of the TRANSFORMER.

b) Transformer «CENTRE INDUSTRIES»



MEASUREMENT POINT (TAGS)	VOLTS	RESISTANCE	AC TEST VOLTS		
			Nominal	+ 3 % (Maxi)	- 3 % (Mini)
BLACK LEAD BROWN LEAD	+ 12	0,04	10	10,3	9,7
RED LEAD	- 12	0,05	10	10,3	9,7
ORANGE LEAD RED LEAD	+ 5	0,10	11,03	11,36	10,7
PINK LEAD	- 5	0,10	11,03	11,36	10,7
BLACK LEAD BROWN LEAD	30	0,68	36,55	37,65	35,45
BLUE LEAD VIOLET LEAD	+ 15	0,75	19,31	19,89	18,73
GREY LEAD WHITE LEAD	- 15	1,93	19,31	19,89	18,73
B4 - B7	33,30	7,46	33,10	34,10	32,11
B7 - B3	19,42	4,39	19,31	19,89	18,73
B3 - B2	52,70	11,99	52,41	53,99	50,84

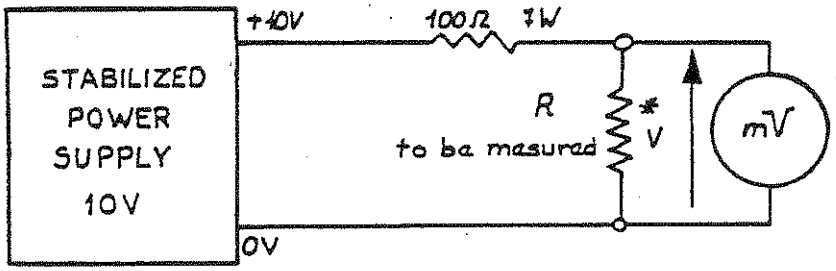
- Switch the equipment off.
- Make the TRANSFORMER, "ALIMENTATION" board, ± 12 V*, POWER AMPLIFIER, DRIVE MOTOR and load resistors connection (see the table of the paragraph ALIMENTATION" board).
- Switch the equipment on and check the power supply outputs using a voltmeter.

10.3 POWER AMPLIFIER

10.3.1 Initial testing

1) Static testing

- Visually test the condition of the parts.
- Using an ohmmeter, test that the power transistors and resistors are not short-circuited with respect to ground.
- On an ohmmeter, check the power transistors and resistors.
- **Check the condition of resistors using the principle described below.**

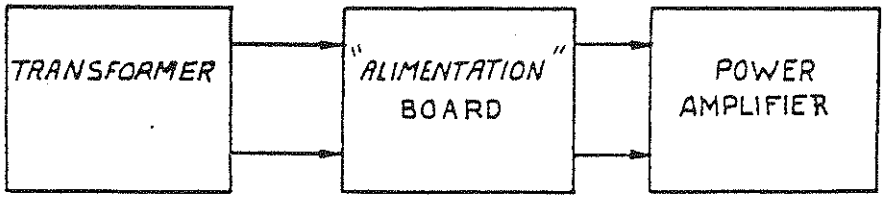


* across the terminals of the 0.1 resistor : U = 10 mV
* across the terminals of the 0.22 resistor : U = 22 mV

- Check that the 4.7 kΩ resistor condition (take care of position of jumper).
- Check the condition of the wiring.

2) Dynamic testing

- Connect as shown below :



- Apply voltage to the equipment and use a voltmeter to test the + 5 V and + 30 V voltages.
- Switch the equipment off.
- Connect a load resistor to the + 5 V (R = 2Ω , P = 15 W) and to the + 30 V (R = 60 Ω , P = 15 W).
- Apply voltage to check the + 5 V and + 30 V voltages.
- Then, proceed as indicated with respect to the testing of the DRIVE MOTOR amplifier.

10.3.2 Disassembly - Assembly

- Replace the defective part(s).

CAUTION : During the assembly of the power transistors, do not forget the insulating bushings placed in the attaching holes of the transistors.

10.3.3 Final testing

- Test as indicated in the first paragraph.

10.4 ± 12 V* POWER SUPPLY

10.4.1 Initial testing

1) Static testing

- Visually check the condition of the ± 12 V* POWER SUPPLY parts.
- Check the parts using an ohmmeter.

2) Dynamic testing

- Connect the ± 12 V* POWER SUPPLY to the TRANSFORMER and switch the equipment on.
- Test the + 12 V* and - 12 V* voltages off-load using a voltmeter.
- Switch the equipment off.
- Connect a load resistor of 8Ω/20 W (rheostat) at the output.
- Apply voltage and check the output voltage (carry out this operation for the + 12 V* and the - 12 V*).

10.4.2 Disassembly - Assembly

- Replace the defective part(s) taking care not to bend the leads too near to the body during assembly.

10.4.3 Final testing

- Test as indicated in the first paragraph.

11 – COMPLEMENTARY EQUIPMENTS

11.1 COVER

11.1.1 Initial testing

- Visually check the condition of the parts.
- Operate the handle hinges and the top section of the COVER.

11.1.2 Disassembly - Assembly

1) Disassembly

From a TX20 assembly :

- Remove the top section of the COVER and the FRONT PANEL ASSEMBLY as described in the field maintenance manual.
- Free the side handle pins and remove them.
- Rock the unit and stand it on the RADIATOR.
- Unscrew the four captive feet and remove the bottom protective grid.
- Remove the four tapped screws attaching the lower section of the COVER.
- Remove the lower section of the COVER by releasing the RADIATOR guides.
- Remove the damaged part(s).

2) Assembly

- Assemble by following the disassembly procedure in the opposite order.

11.1.3 Final testing

- Check the correct operation of all the pivoting points.

11.2 FRONT PANEL ASSEMBLY

11.2.1 Initial testing

- Visually check the condition of the parts.

11.2.2 Disassembly - Assembly

1) Disassembly

- Remove the OPERATIONAL CONSOLE, the PUNCH BACK-SPACER, the KEYBOARD and the TAPE READER as described in the field maintenance manual.

- Remove the module attaching plates.
- Remove the FRONT PANEL.

2) Assemby

- Assemble by following the disassembly procedure in the opposite order.

11.2.3 Final testing

- Check that the keys on the OPERATIONAL CONSOLE and on the KEYBOARD are operating correctly.

11.3 RADIATOR

11.3.1 Initial testing

- Visually check the condition of the RADIATOR.

11.3.2 Disassembly - Assembly

1) Disassembly

On a TX20 assembly :

- Remove the COVER assembly.
- Remove the POWER AMPLIFIER and MAINS FILTER as described in the field maintenance manual.
- Remove the three screws attaching the RADIATOR to the FITTED MOUNTING PLATE.
- Remove the RADIATOR.

2) Assembly

- Assemble by following the disassembly procedure in the opposite order.

11.4 MAIN BASE AND ELECTRONIC BOARD RACK

11.4.1 Initial testing

From a TX20 assembly :

- Apply the functional test program described in the field maintenance manual.

11.4.2 Disassembly - Assembly

1) Disassembly

- Remove the COVER and RADIATOR assembly.

- Remove the electronic printed boards and the modules remaining on the MAIN BASE (see Field Maintenance Manual).
- Remove the two attaching screws and free the LINE STRIP.
- Remove the four attaching screws and the two board guide flanges.
- Remove the two attaching screws and release the "ADAPTATION" board connector.
- Remove the four attaching screws from the connector support and remove the ELECTRONIC BOARD RACK.
- If necessary, remove the other parts.

2) Assembly

- Assemble by following the disassembly procedure in the opposite order.

11.4.3 Final testing

- Apply the functional test program described in the field maintenance manual.

11.5 PROTECTION MODULE

11.5.1 Initial testing

- Visually test the condition of the parts.
- Use an ohmmeter to check the fuse cartridges.

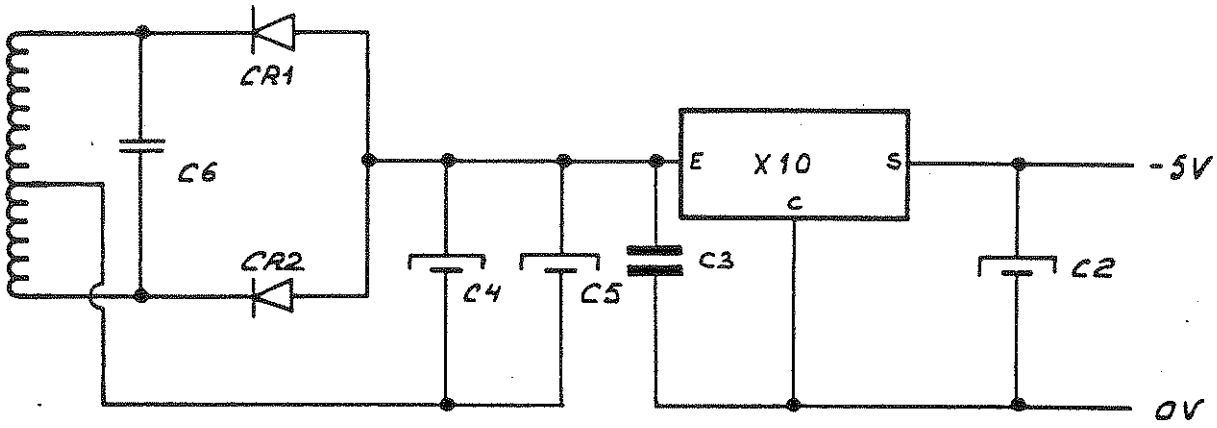
11.5.2 Disassembly - Assembly

- Replace the defective part (s).

9.2 - 5 V, 200 mA POWER SUPPLY

("RAM + RPROM" board, TRANSFORMER)

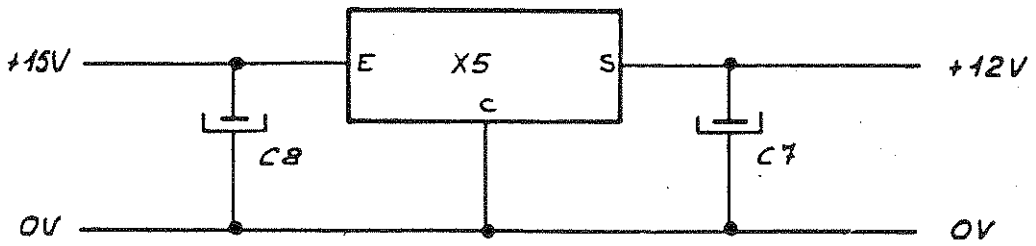
The voltage from the "5 V" (TRANSFORMER) secondary winding is rectified by diodes (CR1 and CR2) and filtered by capacitors (C4 and C5). Regulation is provided by regulator (X10). Capacitor (C2) filters the output voltage of regulator (X10).



9.3 + 12 V, 250 mA POWER SUPPLY

("RAM + RPROM" board)

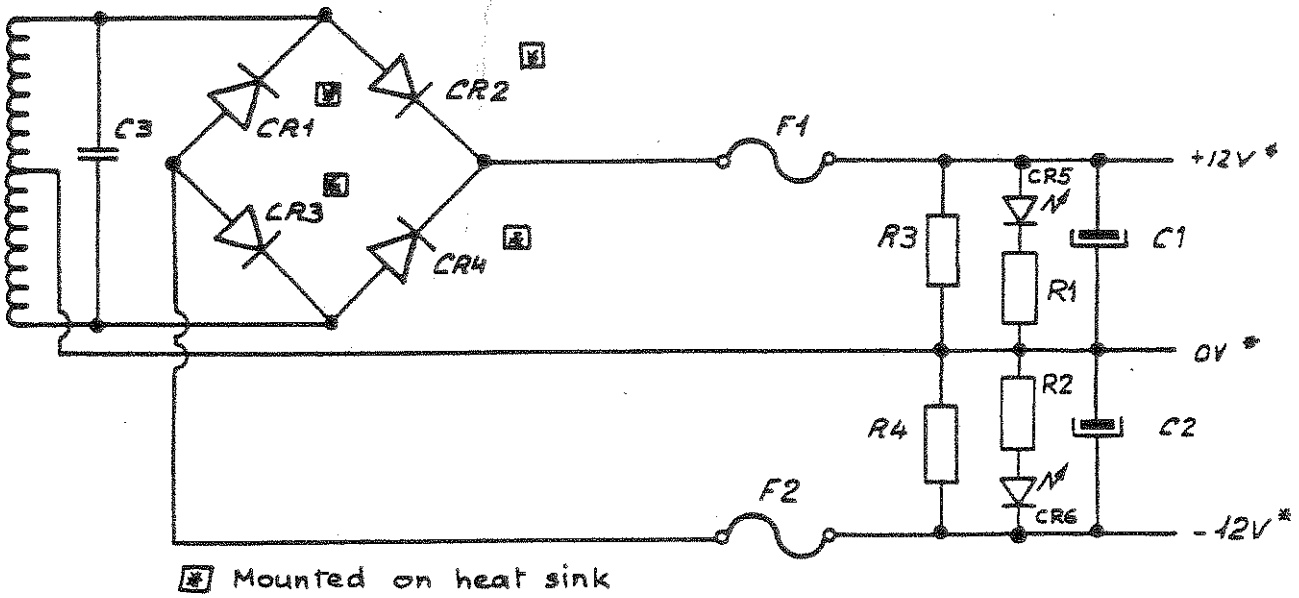
The voltage from the + 15 V is filtered by capacitor (C8) then regulated by regulator (X5). The output voltage is filtered by capacitor (C7).



9.4 + 12 V* AND - 12 V*, 1.5 A POWER SUPPLY (see NOTE)

(± 12 V POWER SUPPLY, TRANSFORMER)

These two voltage sources are obtained from one of the secondary windings whose midpoint is connected to electrical zero. The voltages are rectified by diodes (CR1 to CR4) then filtered by capacitors (C1 and C2). Resistors (R3 and R4) placed across the terminals of capacitors (C1 and C2) improve their discharge when the mains is off. The fuses (F1 and F2) protect the circuit. Light-emitting diodes (CR5 and CR6), supplied through resistors (R1 and R2), display the correct operation of the ± 12 V POWER SUPPLY.

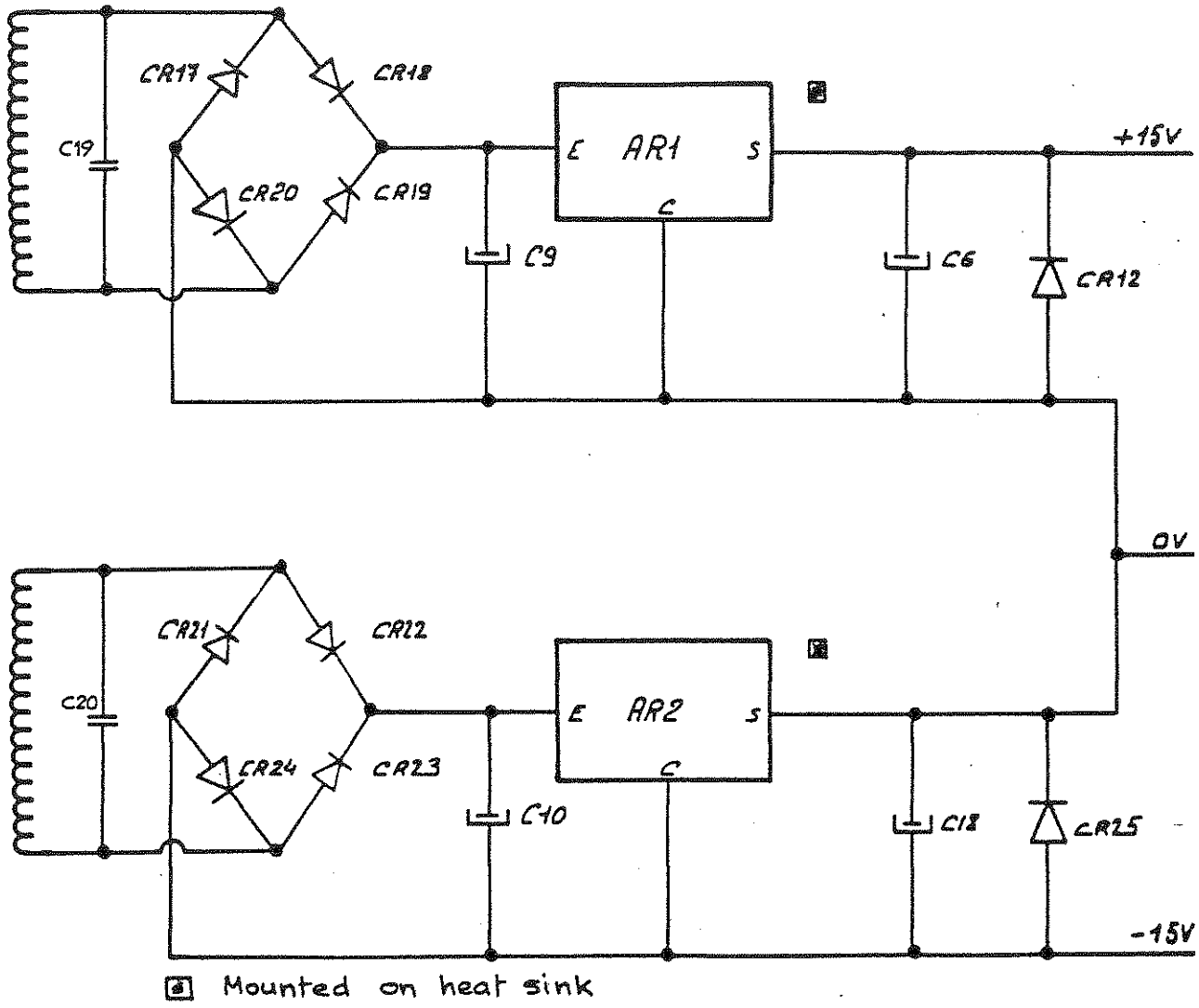


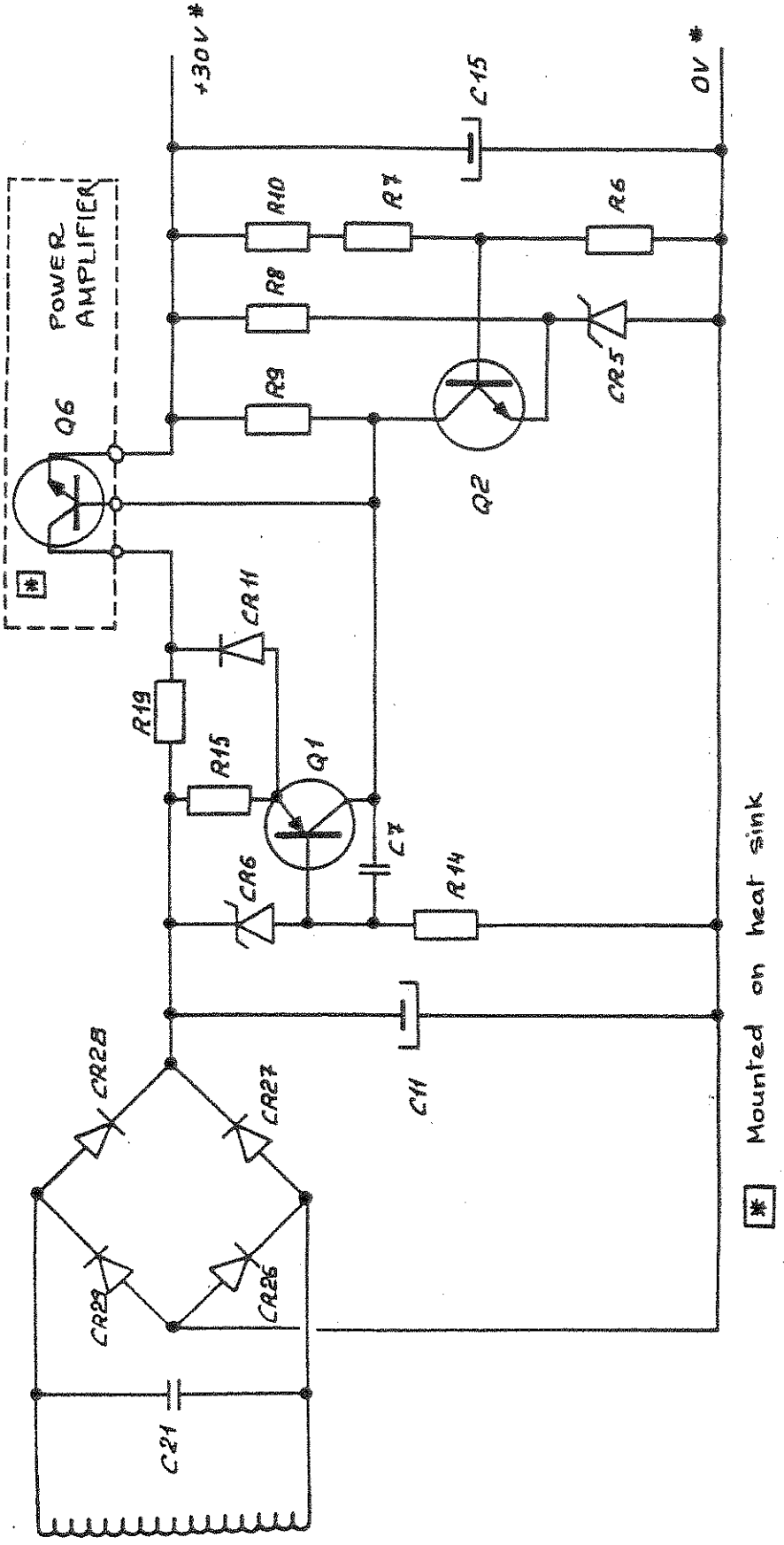
NOTE : The 12 V power supply voltage assigned with the symbol * is a "high current" circuit.

9.5 + 15 V AND -15 V, 500 mA POWER SUPPLY

("ALIMENTATION" board, TRANSFORMER)

The power supply consists of two identical circuits. The voltage from the secondary winding of the TRANSFORMER is rectified by the diodes (CR17 to CR20) which are bridge-connected. The voltage is then filtered by capacitor (C9) and regulated by regulator (AR1). The output voltage is filtered by capacitor (C6). Feedback-connected diode (CR12) protects regulator (AR1) against short-circuits between the + 15 V and - 15 V.





+30V 500mA POWER SUPPLY

9.6 + 30 V*, 500 mA POWER SUPPLY (see NOTE)

("ALIMENTATION" board, POWER AMPLIFIER, TRANSFORMER)

The voltage from one the secondary windings of the TRANSFORMER is rectified by diodes (CR26 to CR29) then filtered by capacitor (C11). Series regulation using a ballast transistor (Q6) controlled by transistors (Q1 and Q2) is employed. Transistor (Q2) compares the output voltage to a reference voltage determined by diode (CR5). A fraction of the output voltage is re-injected at the base of transistor (Q2) by means of resistors (R6, R7 and R10).

Transistor (Q1) operates as a constant current generator with its base current determined by diode (CR6) and resistors (R14 and R15).

Assembly (R19, R15 and CR11), forms a current limiting circuit to (Q6). The voltage developed across the terminals of (R19) with respect to the load limit current enables diode (CR11) to be conductive so that the current of transistor (Q1) is decreased thus resulting in a decrease of the control current of (Q6). Capacitor (C15) filters the output voltage.

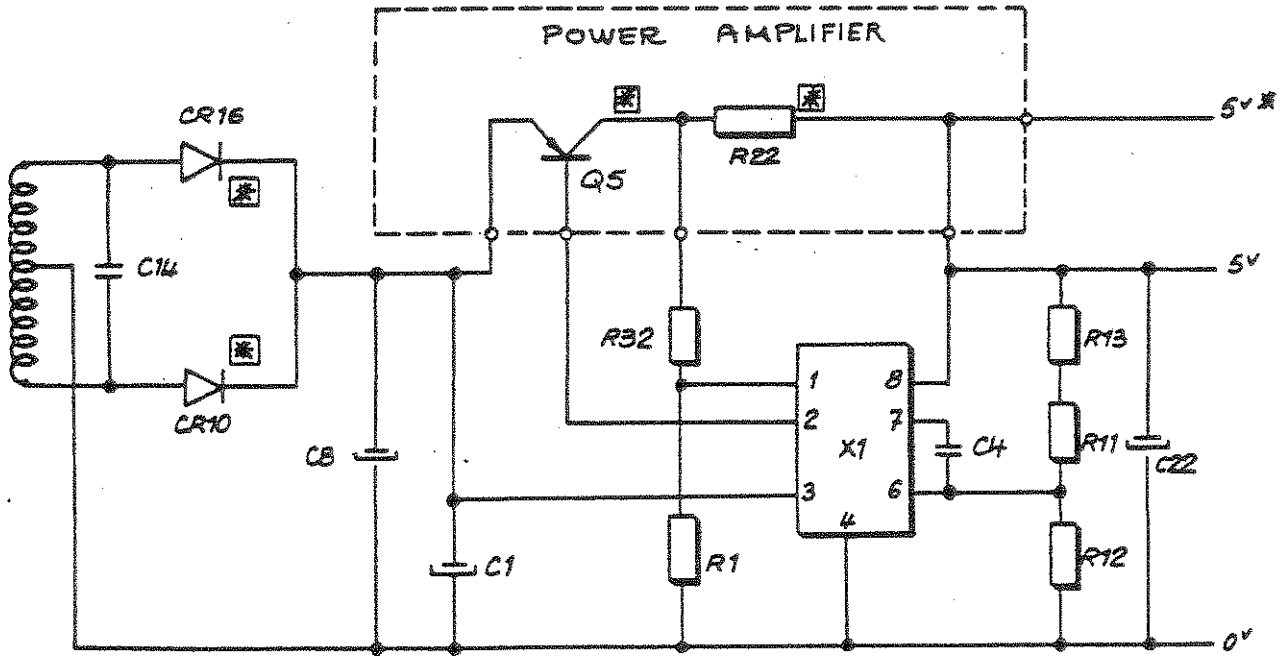
NOTE : The 30 V power supply voltage assigned with symbol * is a "high current" voltage.

9.7 + 5 V*, 2.7 A POWER SUPPLY (see NOTE)

("ALIMENTATION board, POWER AMPLIFIER, TRANSFORMER)

The + 5 V voltage from one of the secondary windings of the TRANSFORMER is rectified by diodes (CR10 and CR16), then filtered by capacitors (C1 and C8). The voltage is regulated by regulator (X1) with which power transistor (Q5) is associated. Resistors (R1, R22 and R32) provide the feedback for regulator (X1) in order to limit the output current.

The resistor bridge (R11, R12 and R13) is used for adjusting and fixing the output voltage which is filtered by capacitor (C22).



NOTE : The 5 V power supply voltage assigned with symbol * is a "high current" voltage.

9.8 PROTECTION MODULE (Plate 3-3)

A protection module mounted between the secondary winding of the transformer and the different power supplies, ensures the protection of every winding of the secondary.

The module is holded under the base and consists of :

- 2 fuse cartridges 0,31 A TD (Yellow) for the TG board
- 1 fuse cartridge 0,4 A TD (Black) for the - 15 V
- 1 fuse cartridge 0,8 A TD (Blue) for the + 15 V
- 1 fuse cartridge 2 A TD (Green) for the + 30 V
- 1 fuse cartridge 4 A TD (Red) for the + 5 V

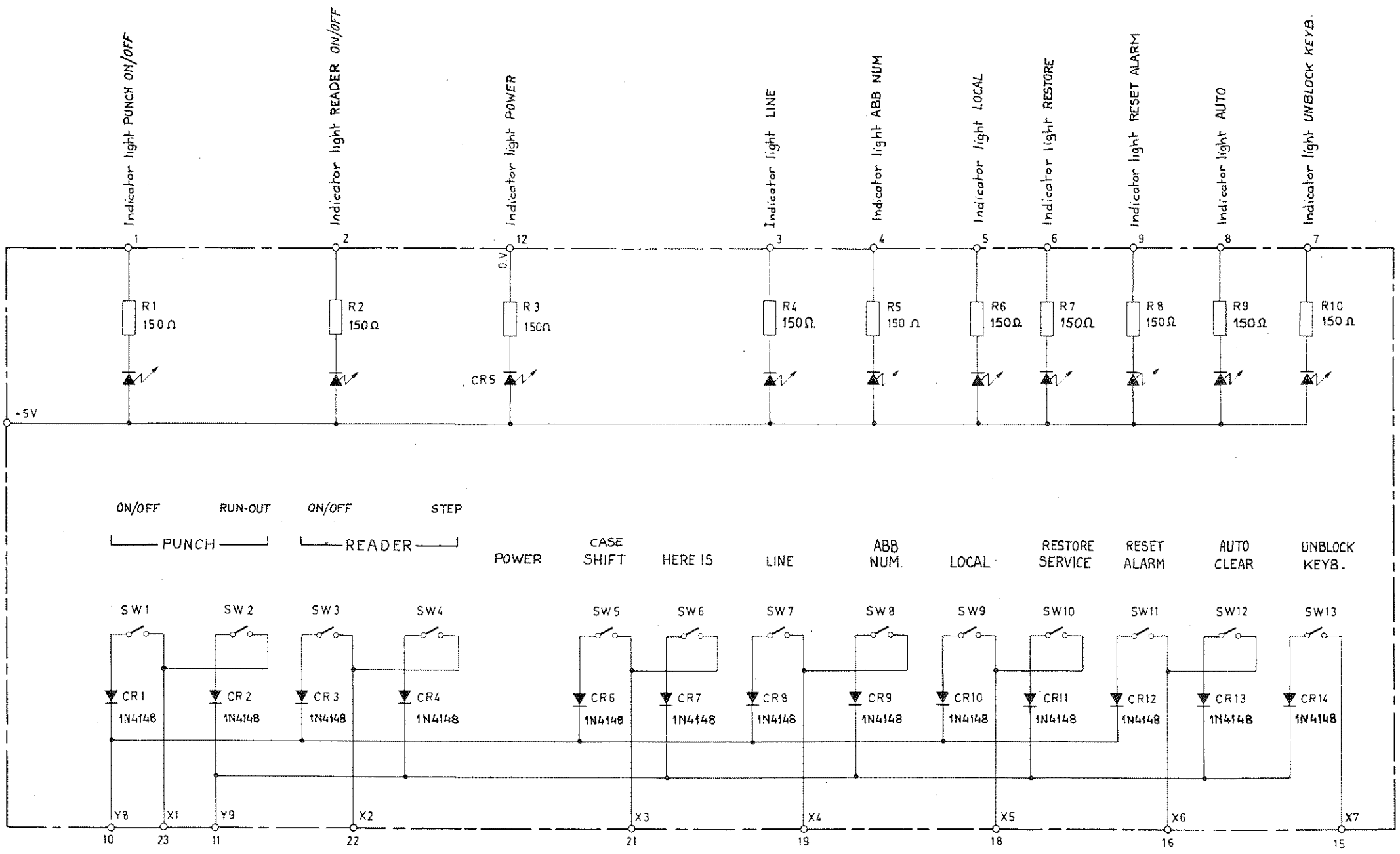
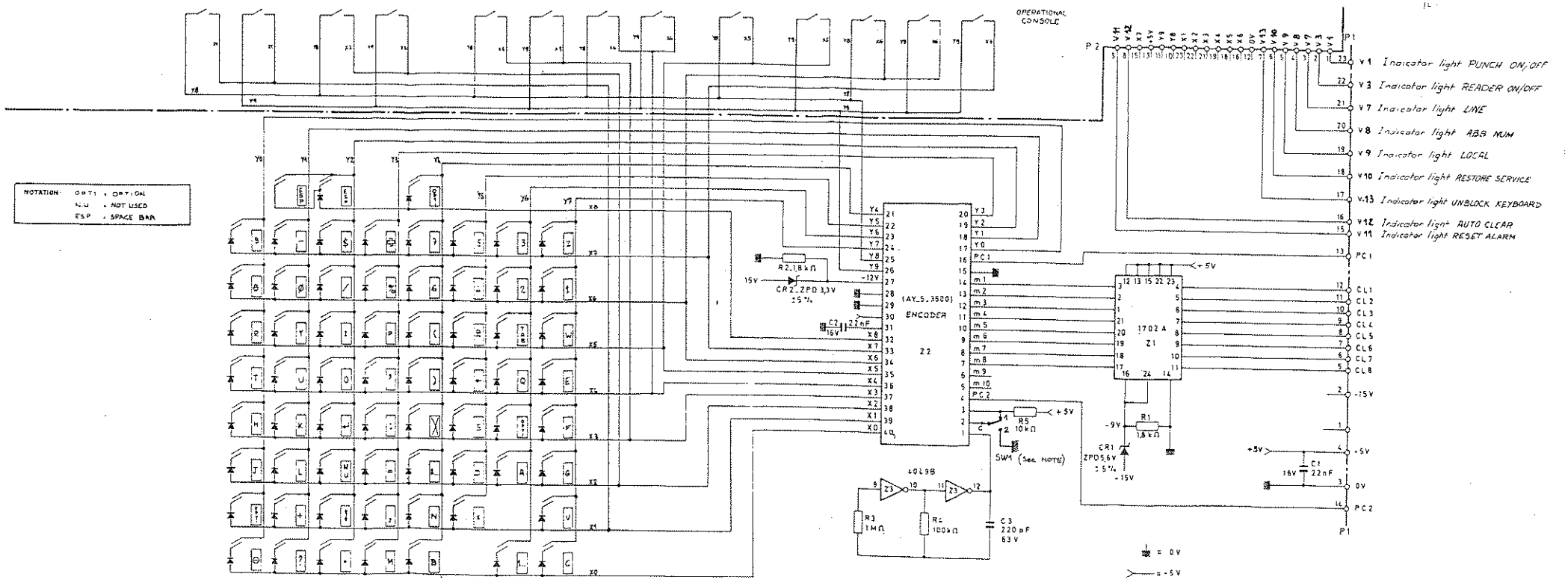


PLATE 1

"OPERATIONAL CONSOLE" BOARD 23074375-7

TX 20



NOTE : SW1 _1 Fast typing 2 keys
_2 Fast typing N keys

PLATE 2.1
"KEYBOARD" board 23074795_8
TX 20

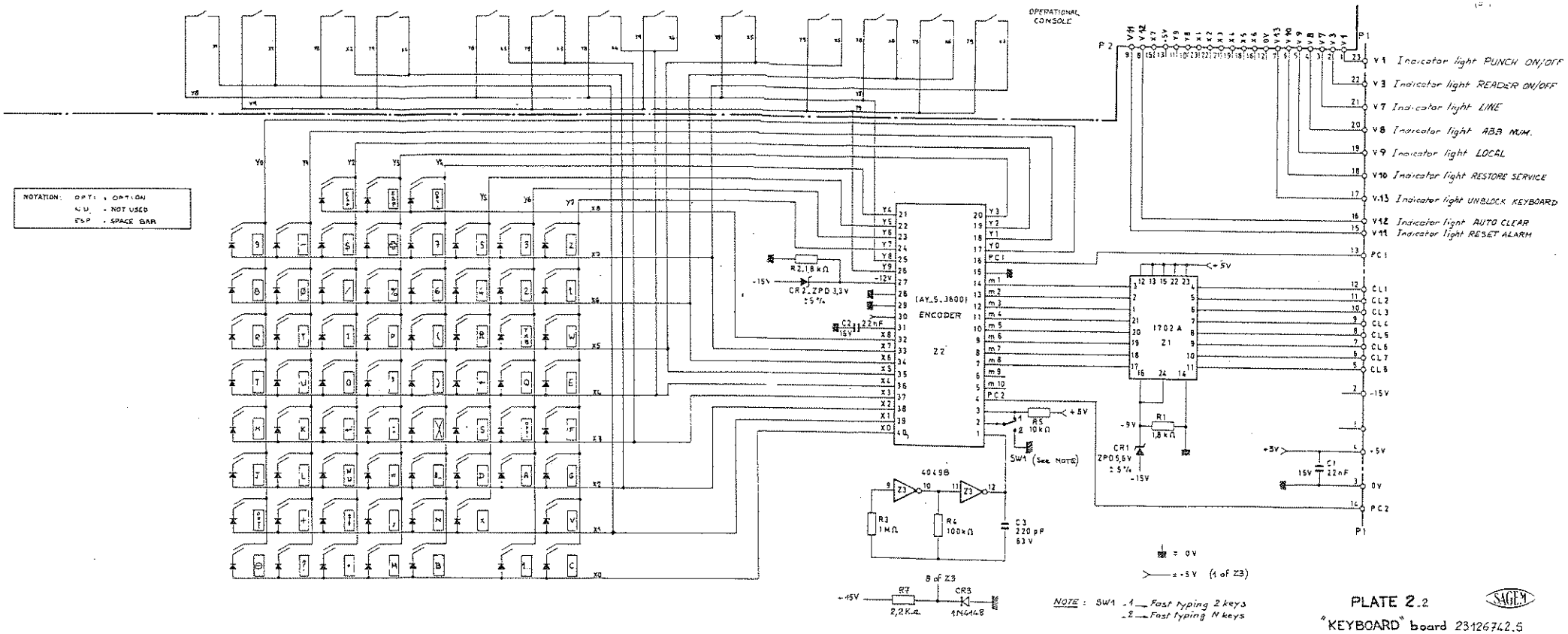


PLATE 2.2

"KEYBOARD" board 23126742.5

TX 20

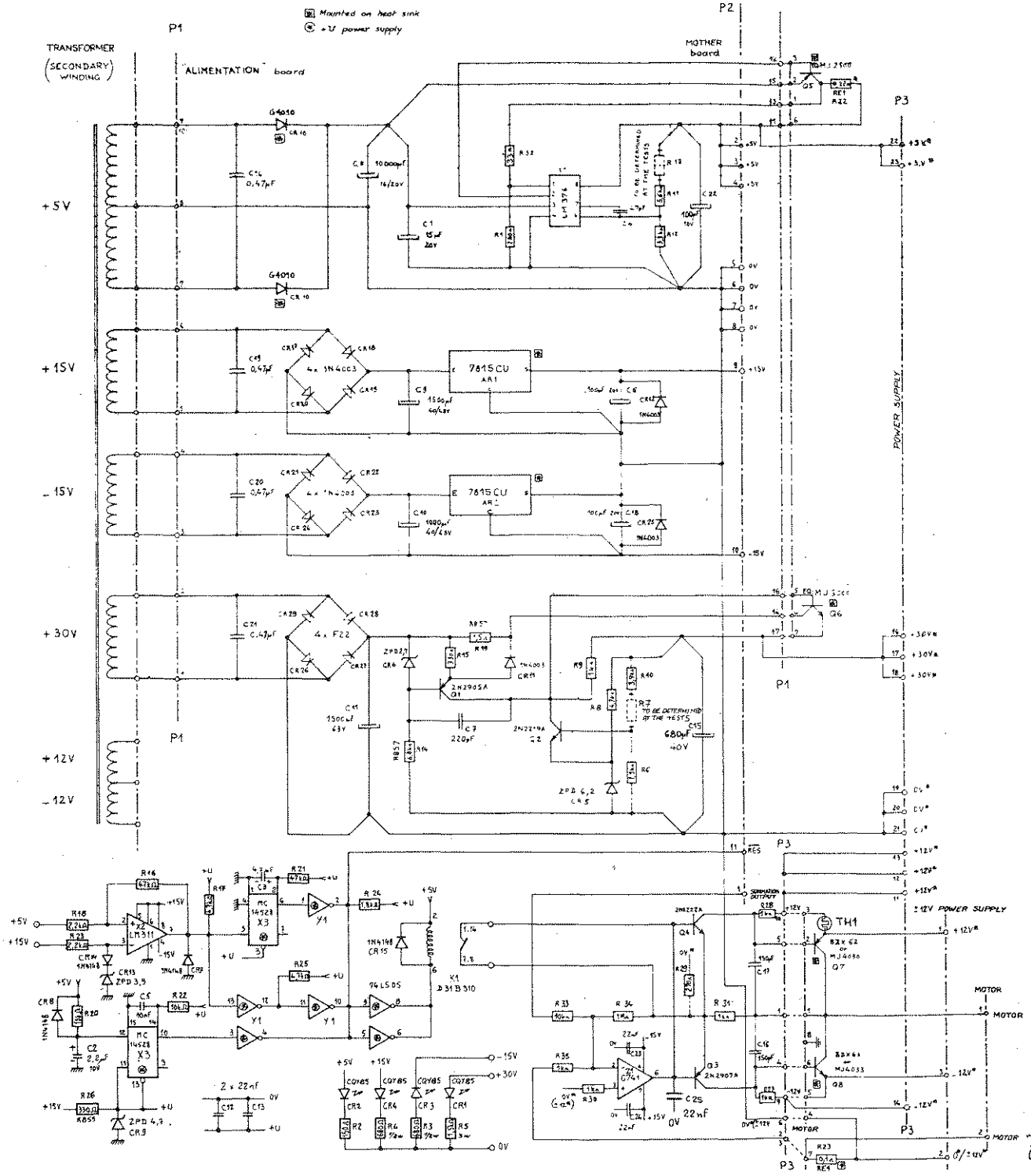


PLATE 3.1
"ALIMENTATION" board 23074407-2
(AND POWER AMPLIFIER)
TX 20

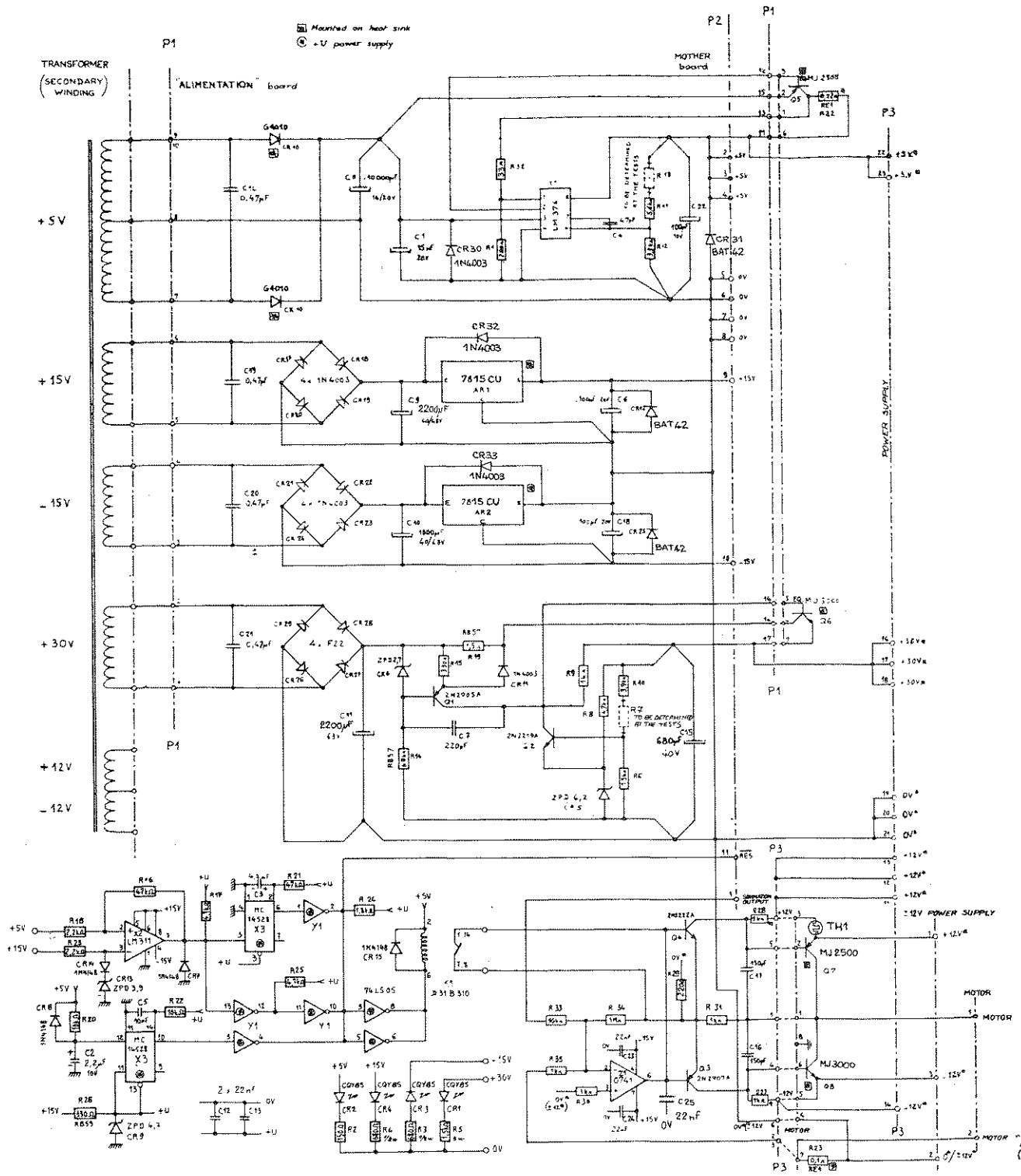


PLATE 3.2
"ALIMENTATION" board 23117707-2
(AND POWER AMPLIFIER)
TX 20

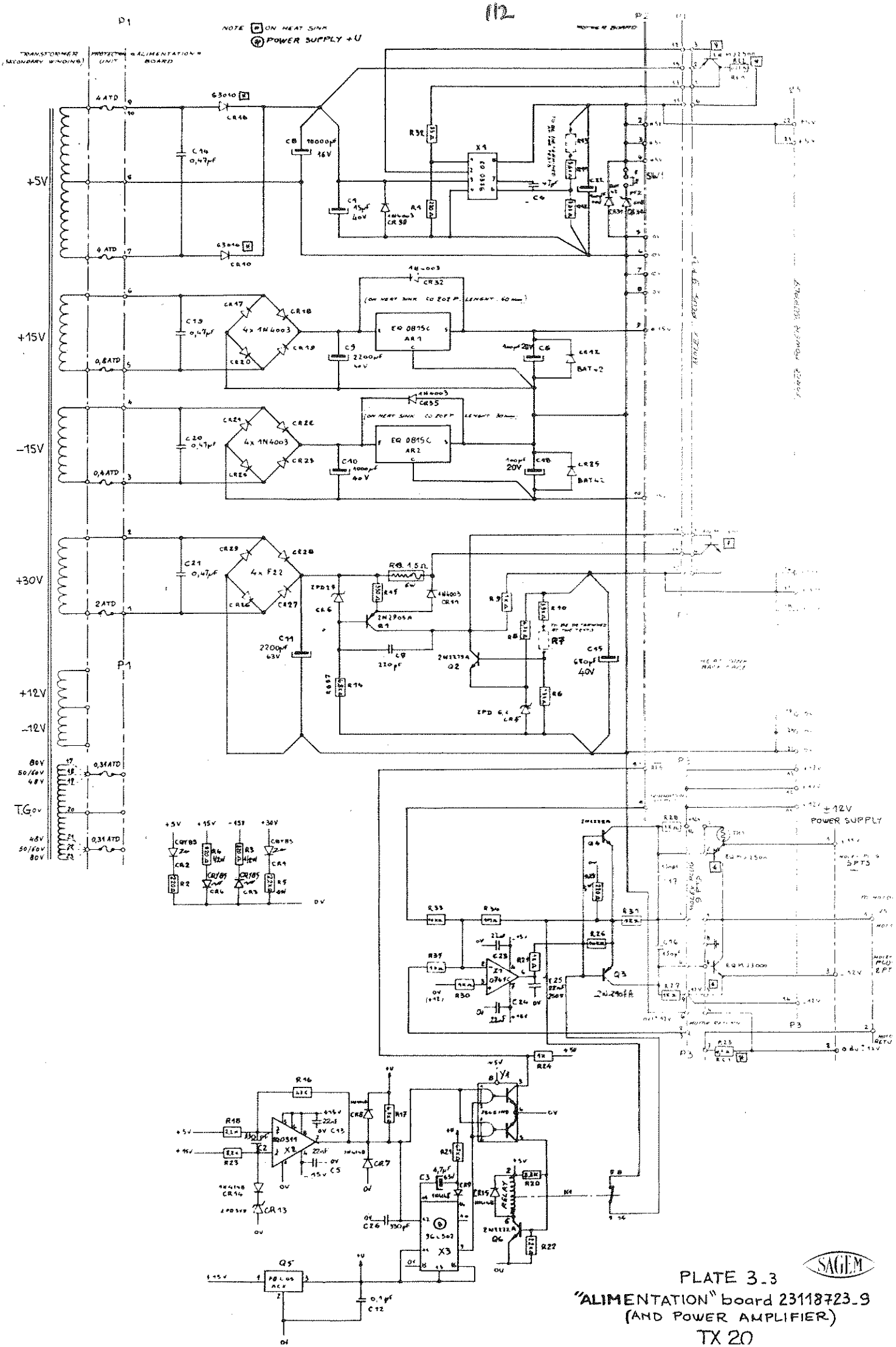
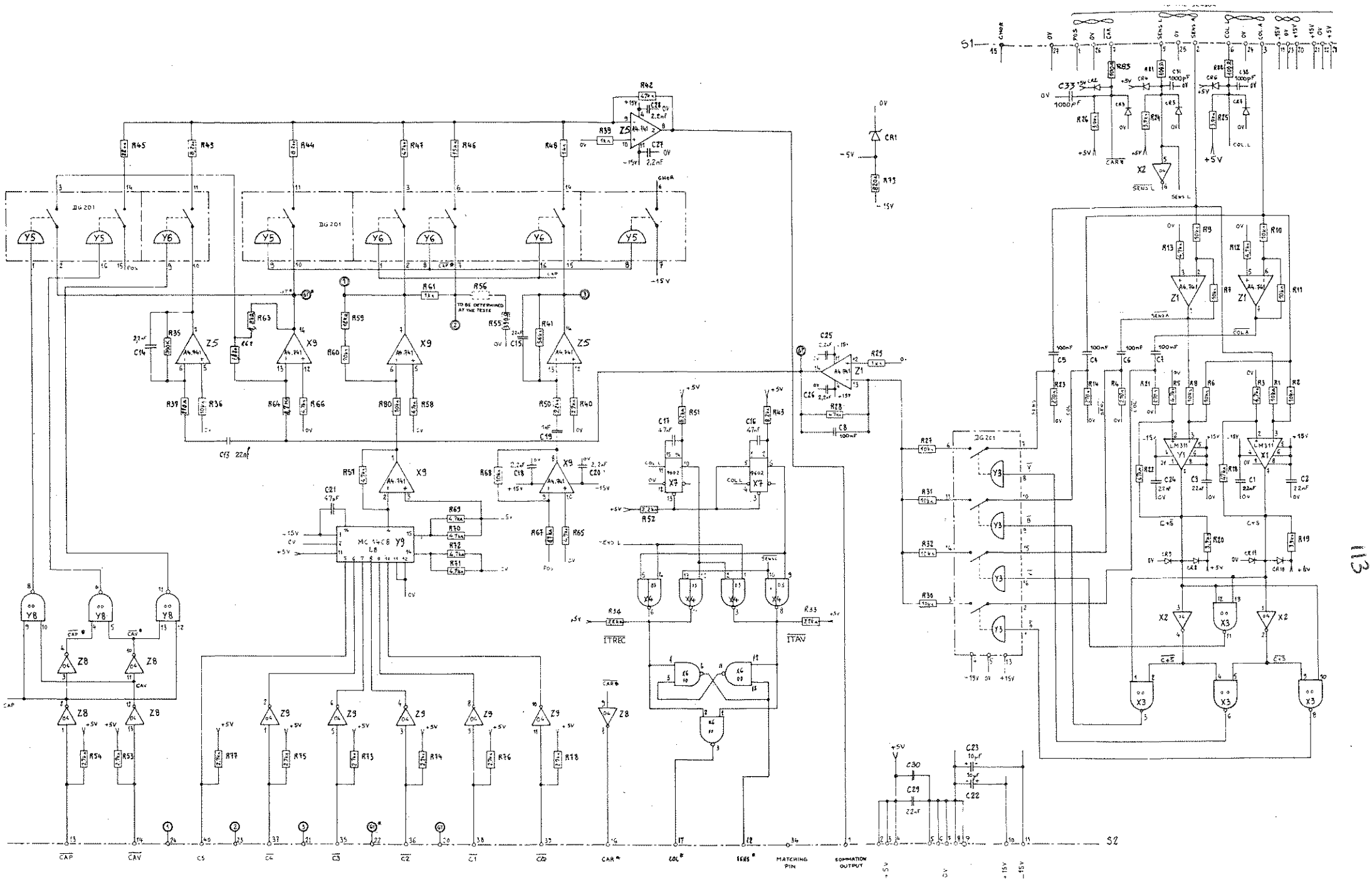


PLATE 3.3

"ALIMENTATION" board 23118723-9 (AND POWER AMPLIFIER)

TX 20


S1
S2
MOTHER board
CAP
CAV
CS
C4
C3
C2
C1
C0
CAR*
COL*
SENS*
MATCHING PIN
SOMMATION OUTPUT
ITREC
ITAV
SENS L
SENS A
COL A
COL L
CAR*
+5V
-5V
-15V
0V
+15V
TO BE DETERMINED AT THE TESTE
DG 201
MC 14C8 L8
9602
LM 311
AM 741
C13 22nF
PLATE 4
"ASSERVISSEMENT" board 23074415-5
TX 20
SAGEM

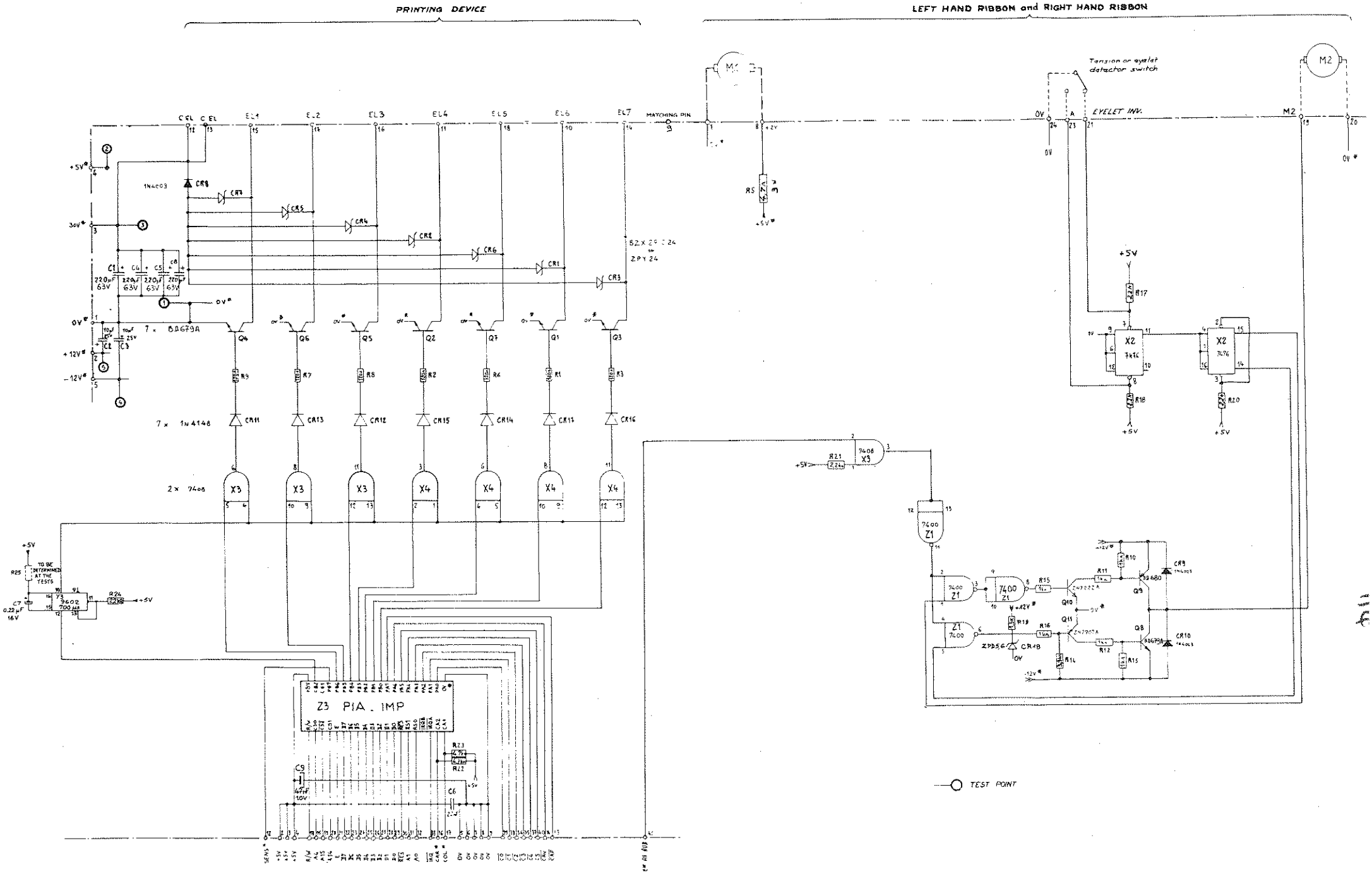


PLATE 5.1
"PIA IMP" board 2
TX 20

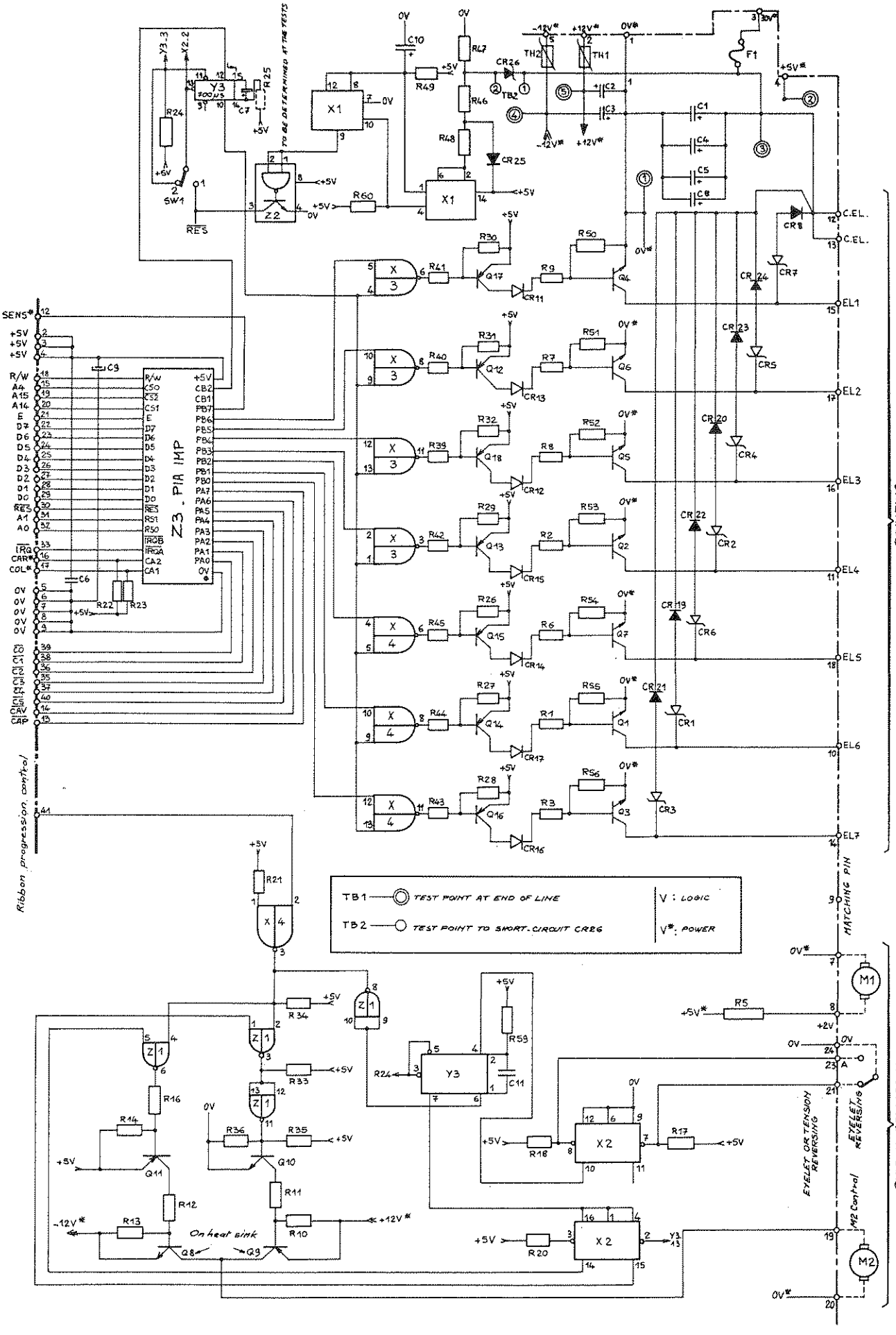


PLATE 5.2

"PIA IMP" board 23117644-2

TX20

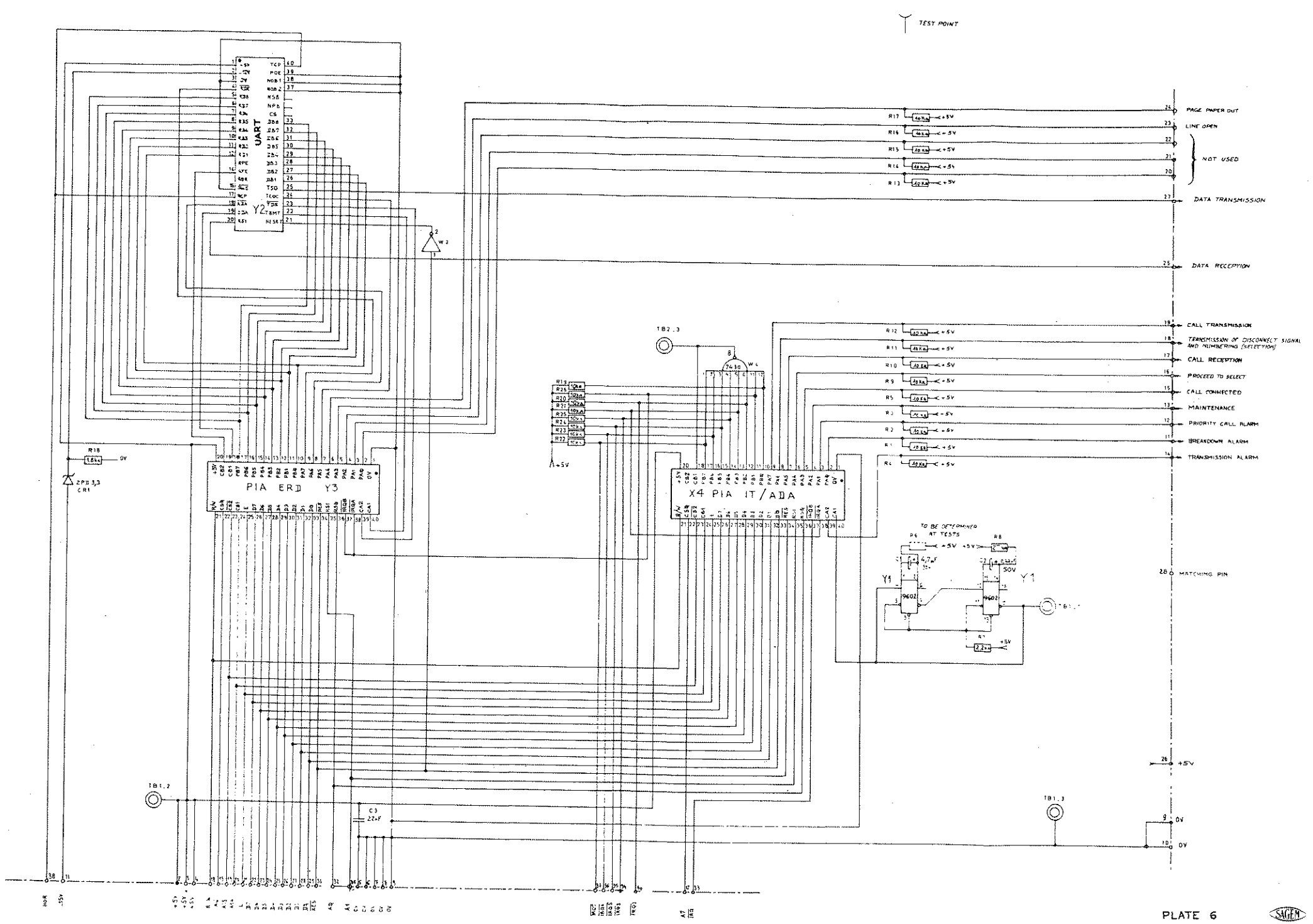


PLATE 6

"PIA ERD+ IT/ADA" board 23074667_0

TX 20

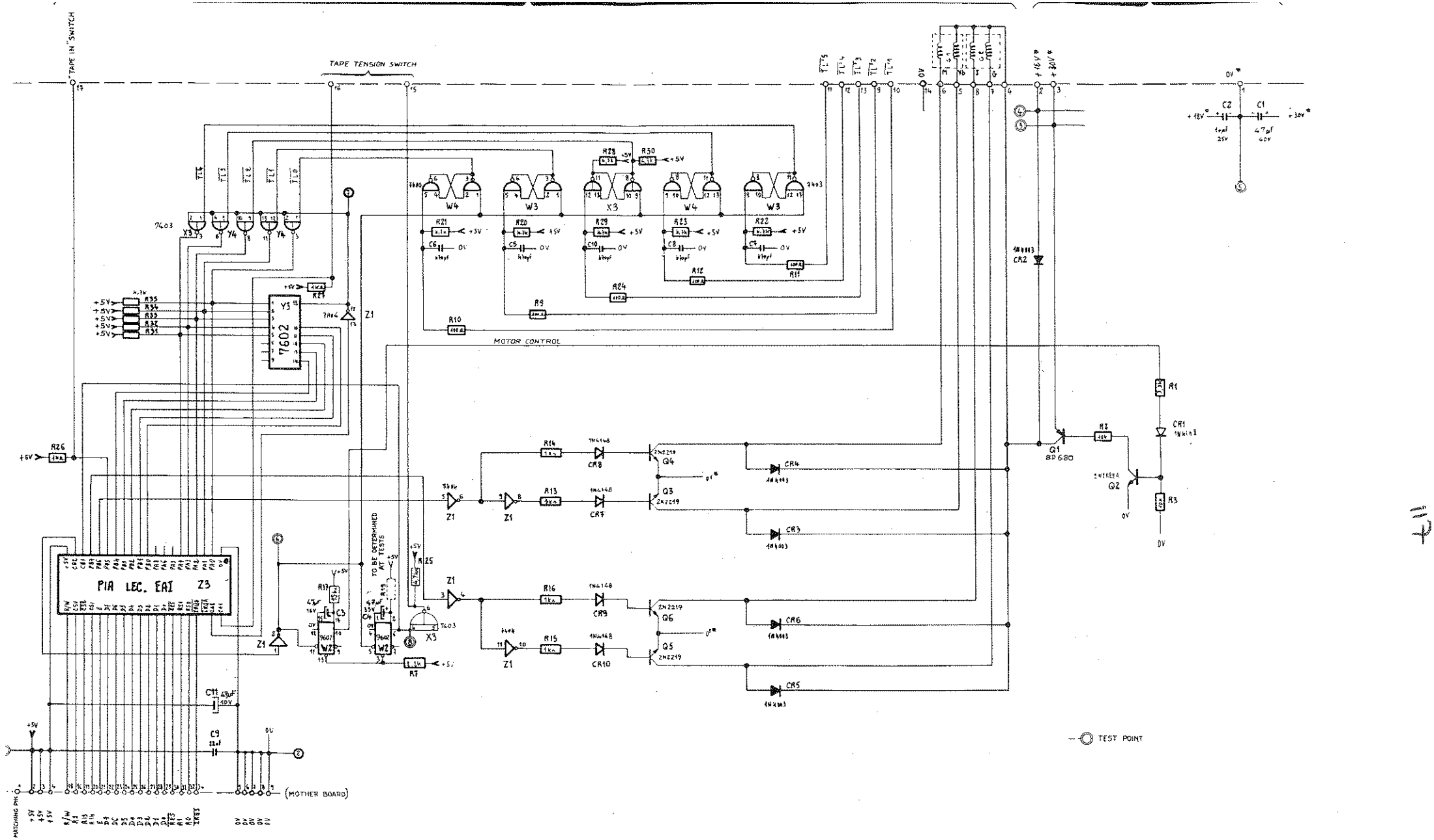
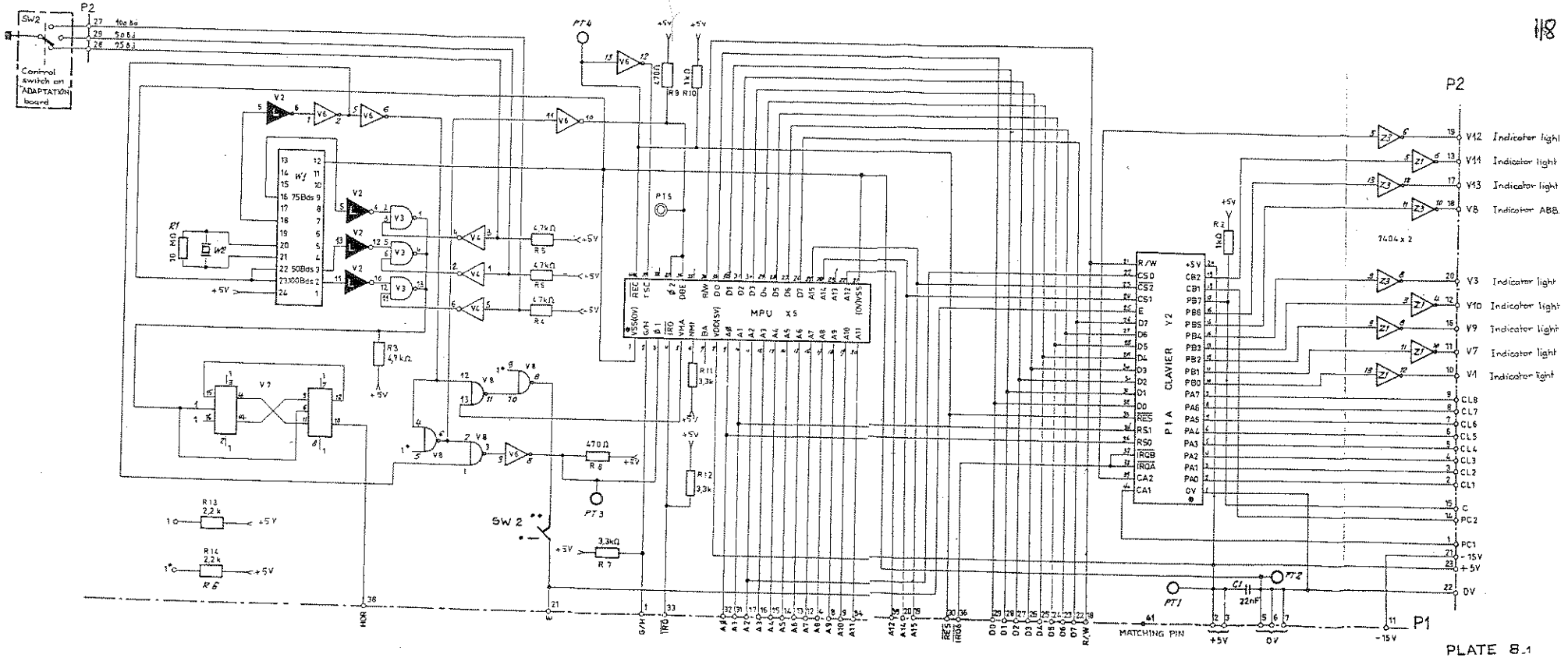


PLATE 7

"PIA LECTEUR + AMPLI" board 23

TX 20


SW2
P2
Control switch on "ADAPTATION" board
MPU X5
PIA CLAVIER Y2
P1
MATCHING PIN
SW 2
Indicator light
Indicator ABB.
7404 x 2
PLATE 8.1
"PIA CLAVIER + MPU" bo
TX 20

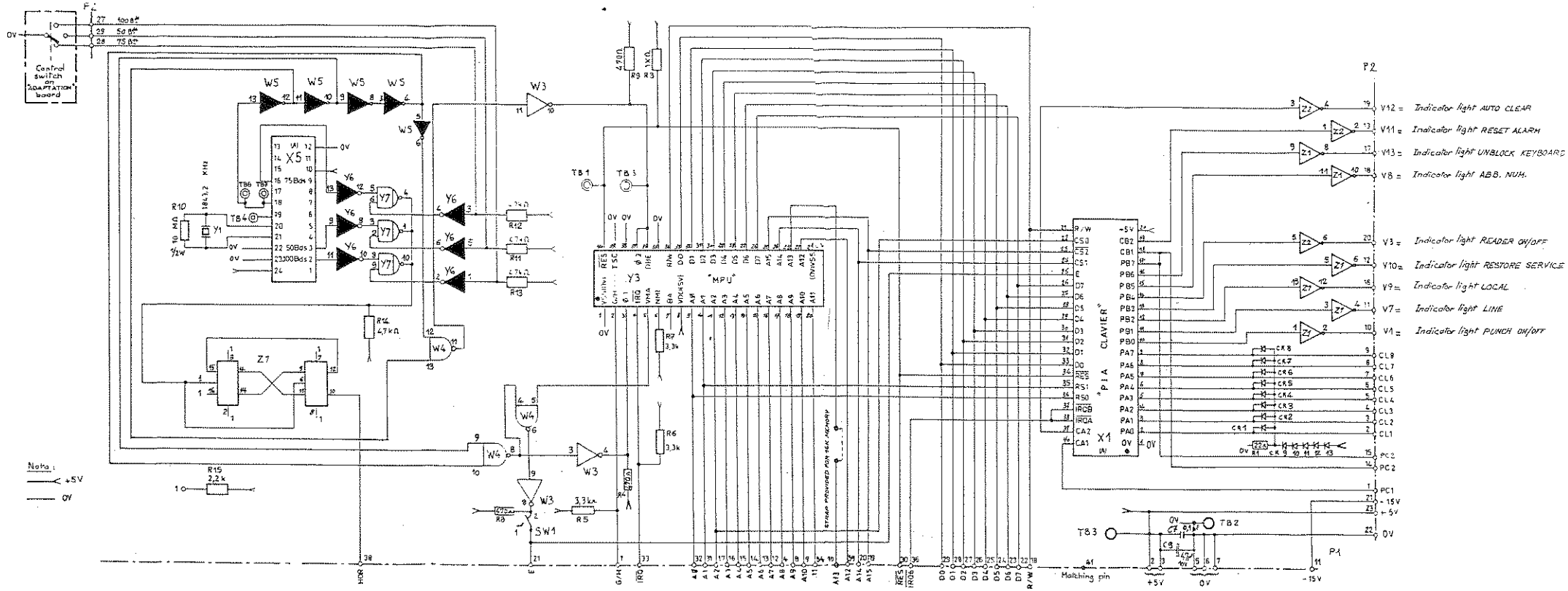


PLATE 8.2

"PIA CLAVIER + MPU" board 23077489.3

TX 20

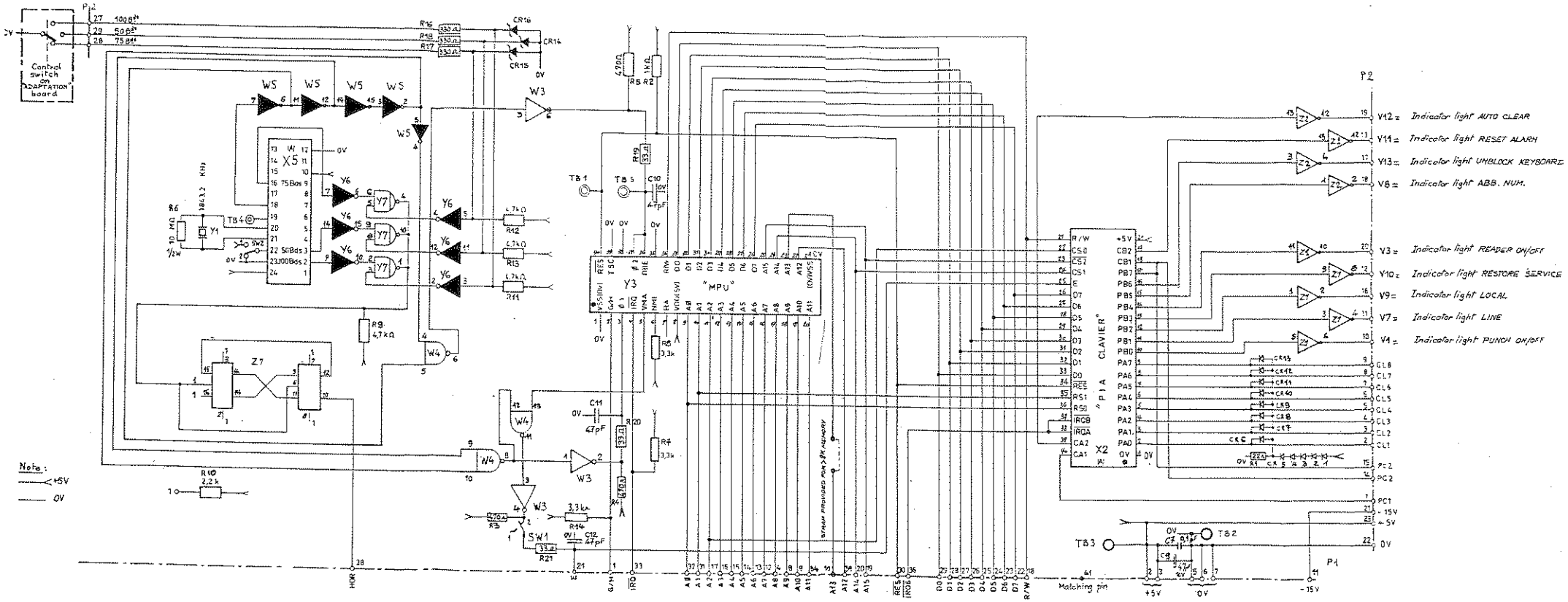


PLATE 8.3

"PIA CLAVIER+MPU" board 23106892_6

TX 20

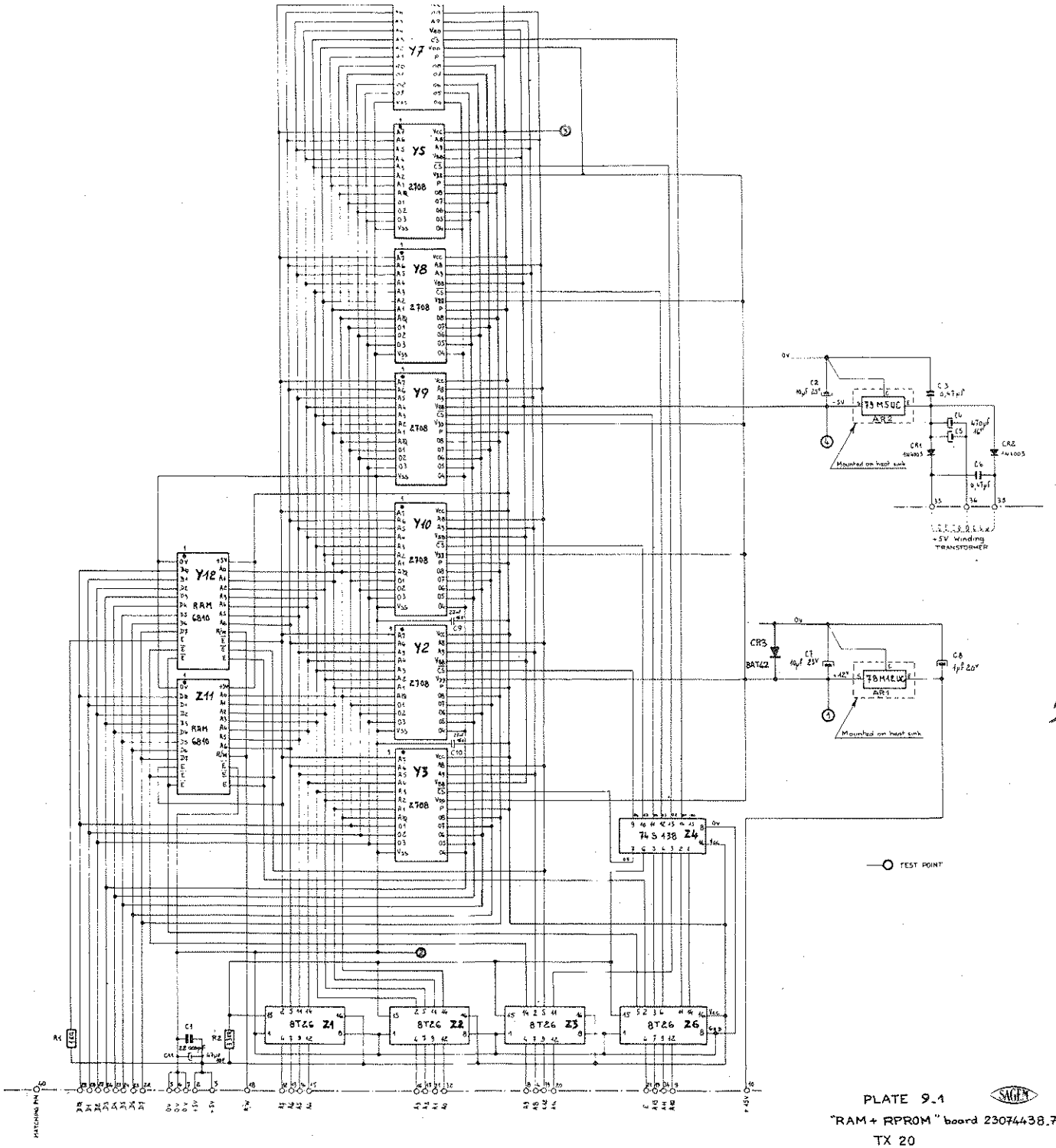


PLATE 9.1

"RAM + RPROM" board 23074438.7

TX 20

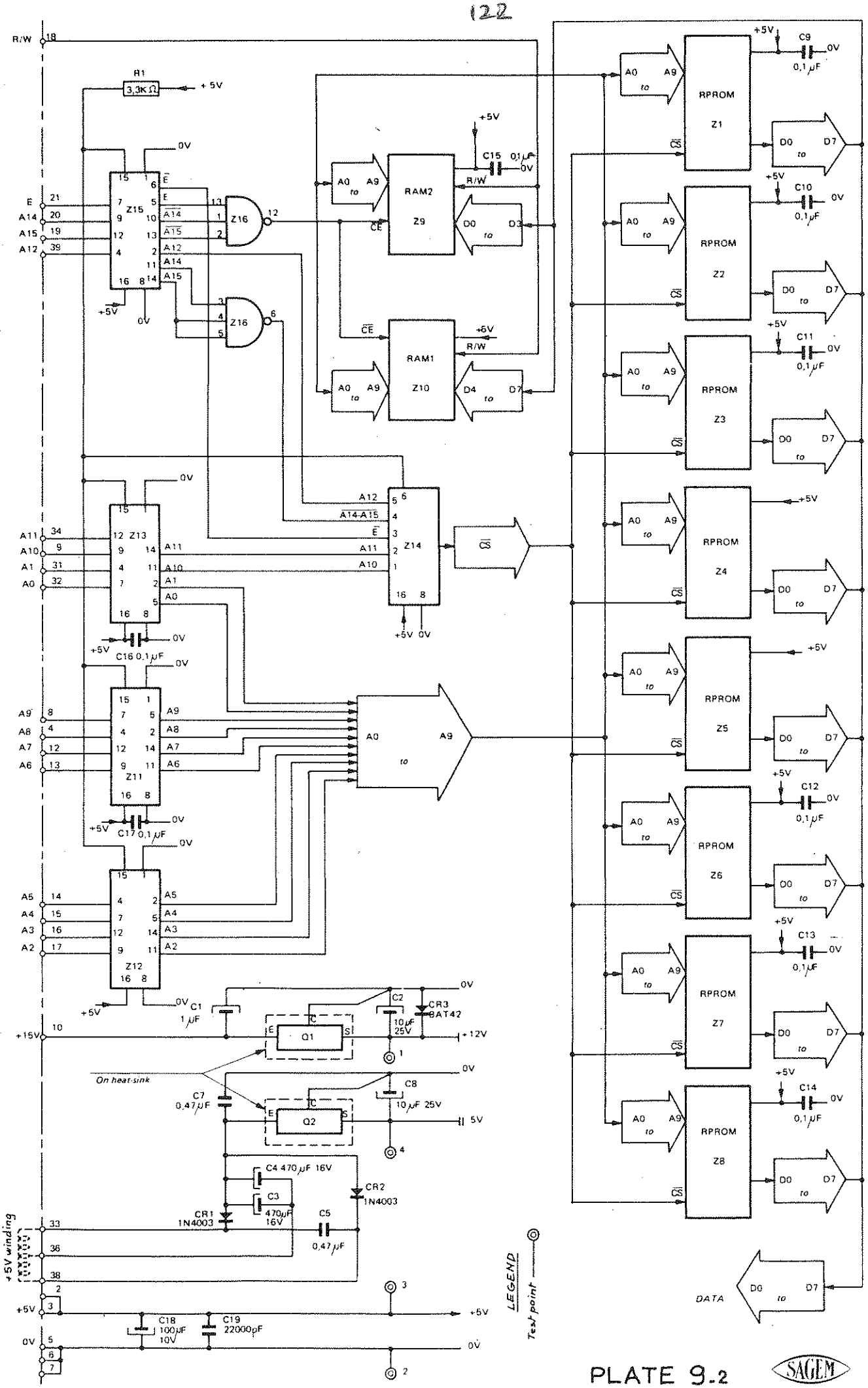
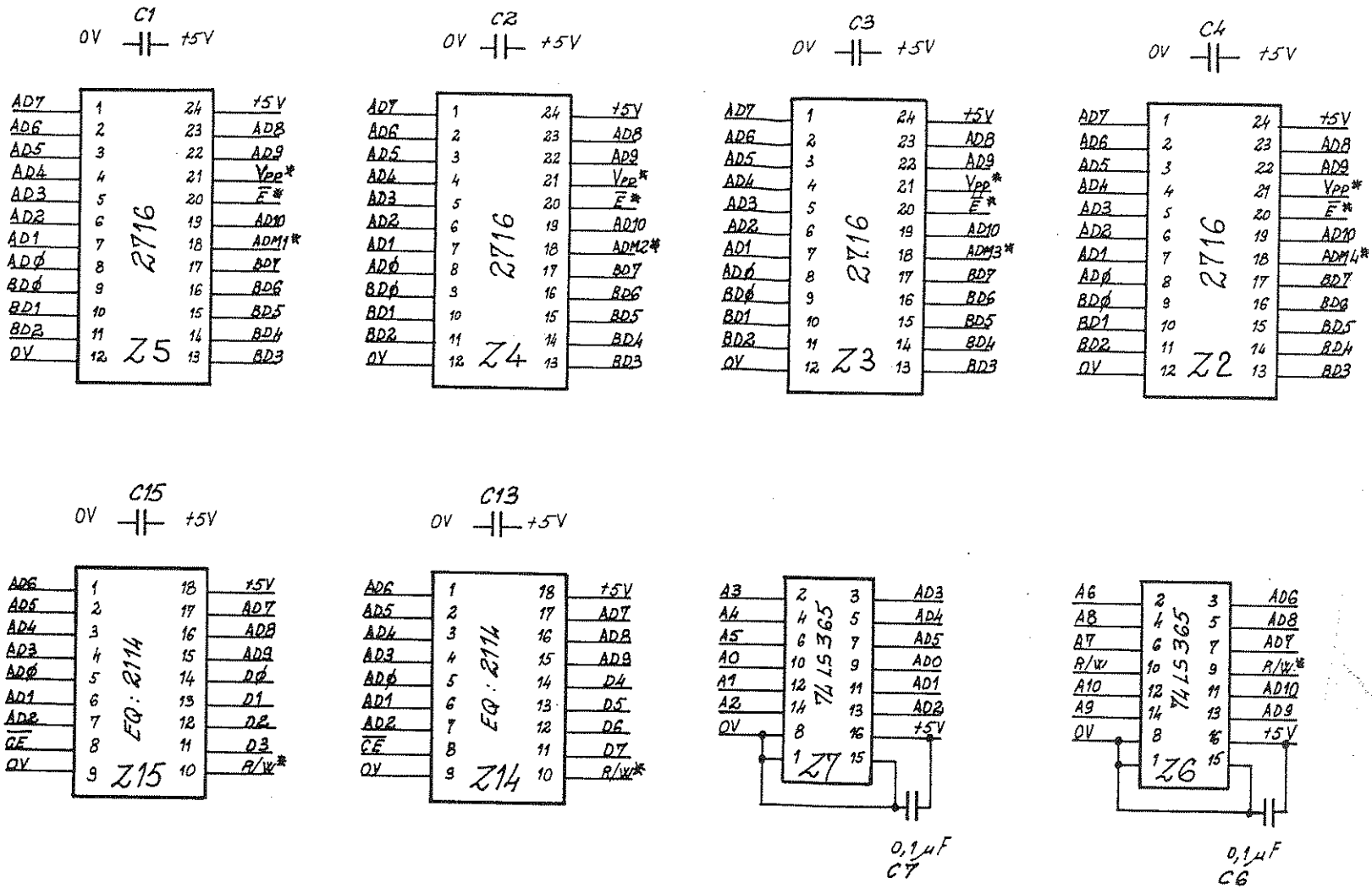


PLATE 9.2

"RAM + RPROM" board 23101491_5

TX 20

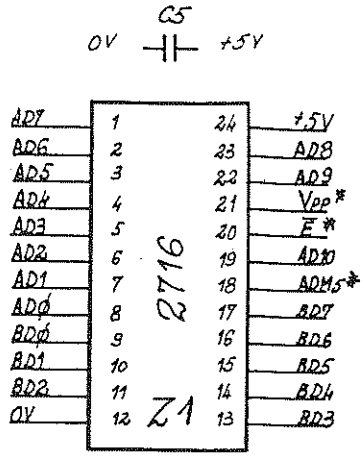

C1
0V
+5V
AD7 AD6 AD5 AD4 AD3 AD2 AD1 AD0 BD0 BD1 BD2 0V
+5V AD8 AD9 Vpp* F* AD10 ADM1* BD7 BD6 BD5 BD4 BD3
2716
Z5
C2
0V
+5V
AD7 AD6 AD5 AD4 AD3 AD2 AD1 AD0 BD0 BD1 BD2 0V
+5V AD8 AD9 Vpp* F* AD10 ADM2* BD7 BD6 BD5 BD4 BD3
2716
Z4
C3
0V
+5V
AD7 AD6 AD5 AD4 AD3 AD2 AD1 AD0 BD0 BD1 BD2 0V
+5V AD8 AD9 Vpp* F* AD10 ADM3* BD7 BD6 BD5 BD4 BD3
2716
Z3
C4
0V
+5V
AD7 AD6 AD5 AD4 AD3 AD2 AD1 AD0 BD0 BD1 BD2 0V
+5V AD8 AD9 Vpp* F* AD10 ADM4* BD7 BD6 BD5 BD4 BD3
2716
Z2
C15
0V
+5V
AD6 AD5 AD4 AD3 AD0 AD1 AD2 CE 0V
+5V AD7 AD8 AD9 D0 D1 D2 D3 R/W*
EQ: 2114
Z15
C13
0V
+5V
AD6 AD5 AD4 AD3 AD0 AD1 AD2 CE 0V
+5V AD7 AD8 AD9 D4 D5 D6 D7 R/W*
EQ: 2114
Z14
A3 A4 A5 A0 A1 A2 0V
AD3 AD4 AD5 AD0 AD1 AD2 +5V
74LS365
Z7
0,1µF
C7
A6 A8 A7 R/W A10 A9 0V
AD6 AD8 AD7 R/W* AD10 AD9 +5V
74LS365
Z6
0,1µF
C6
C17
22000pF
C16
100MF 10V
A9 A10 A13 A7 A6 A5 A4 A3 A2 R/W A15 A14 E D7 D6 D5 D4 D3 D2 D1 D0 A1 A0 A11 A12 Matching pin
P1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
+5V +5V A8 0V 0V 0V

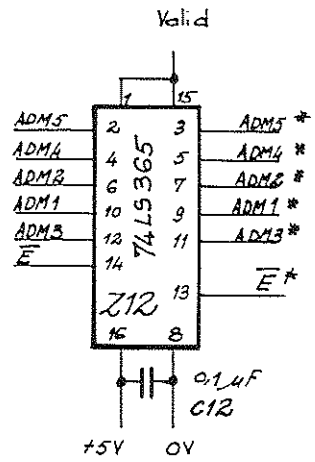
123A

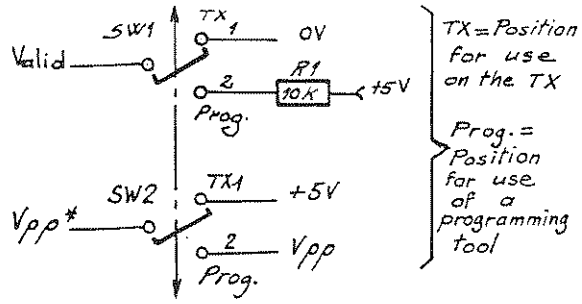
NOTE :

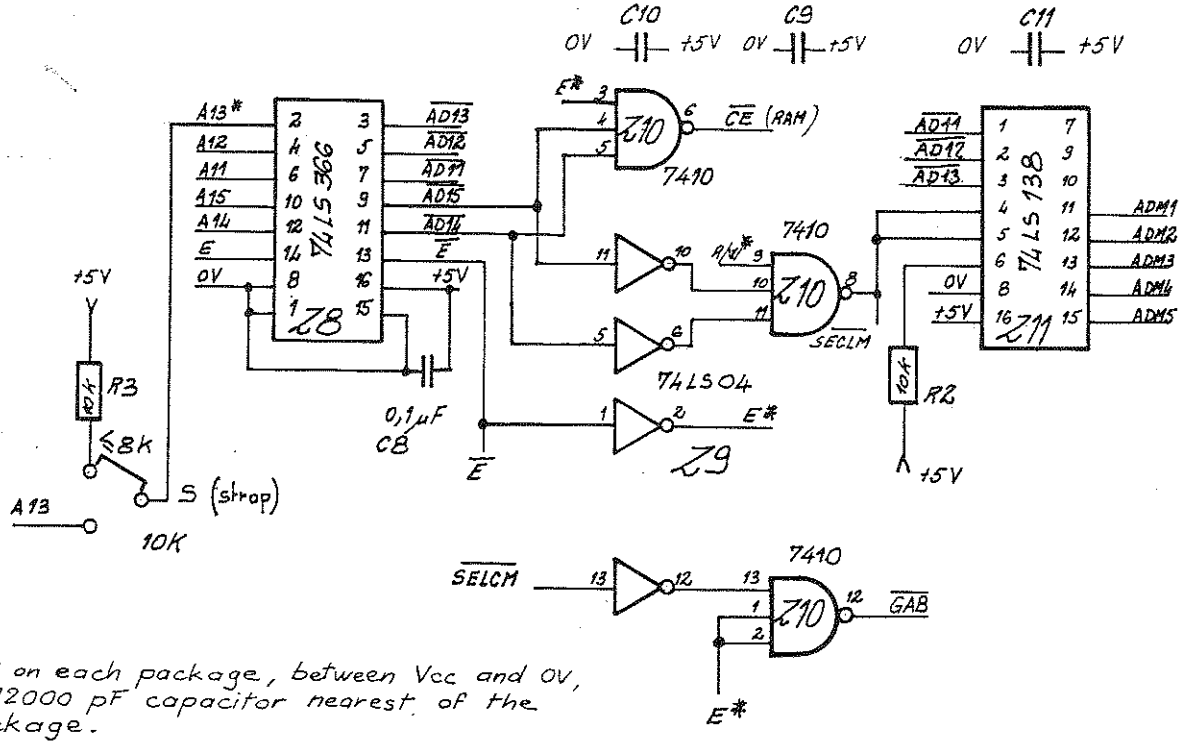
PLATE 9.3

"RAM + RPROM" board 23118714-3

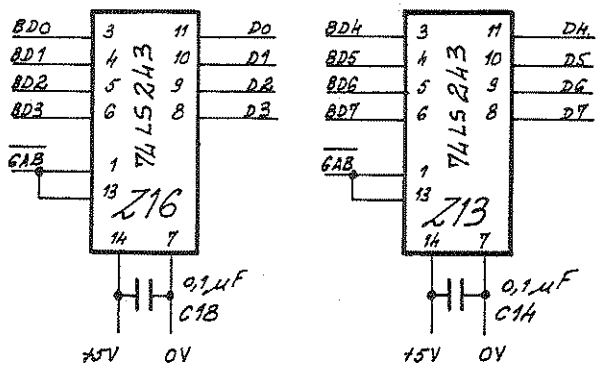








Put on each package, between Vcc and 0V, a 22000 pF capacitor nearest of the package.



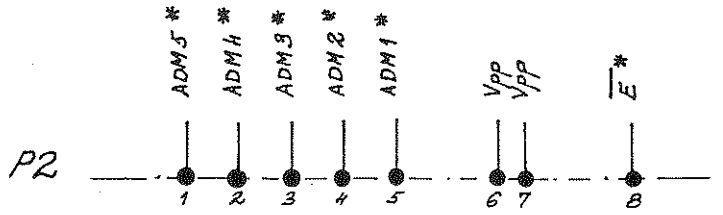


PLATE 9.3

"RAM+RPROM" board 23118714-3

SAGEM

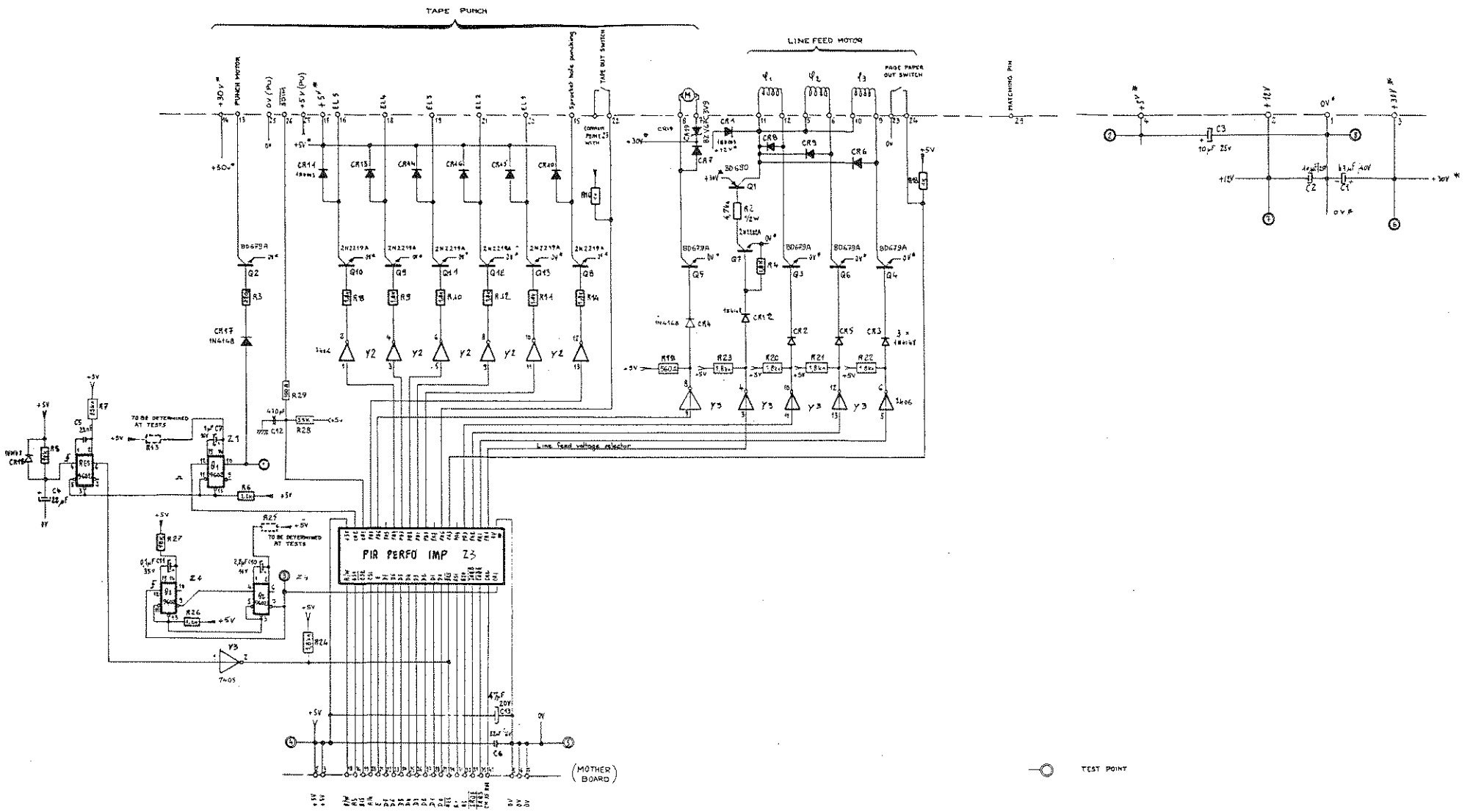


PLATE 10.1

"PIA PERFO + AMPLI" board 23073040-3

TX 20

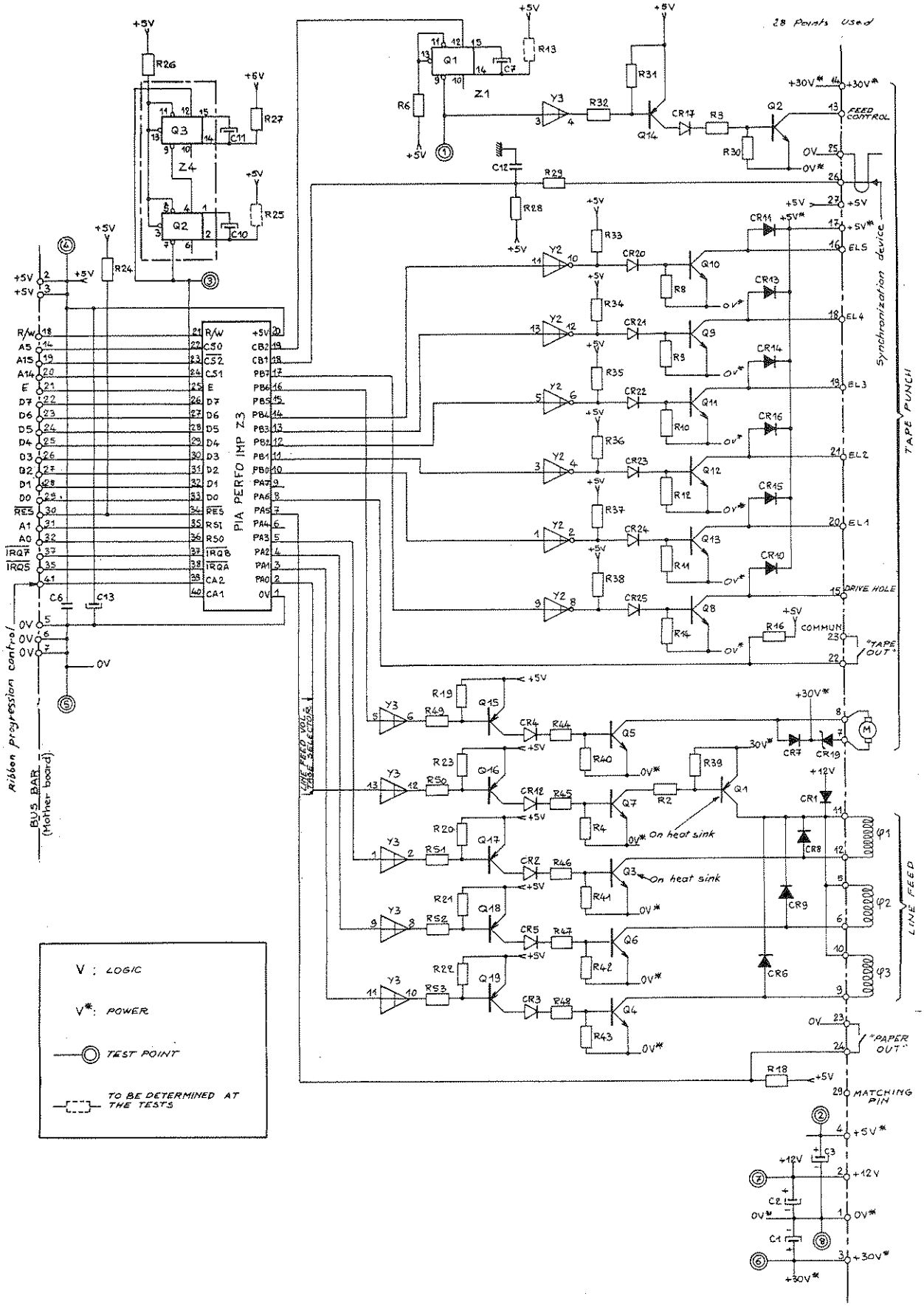


PLATE 10.2

"PIA PERFO + AMPLI" board 23119272.7

TX20

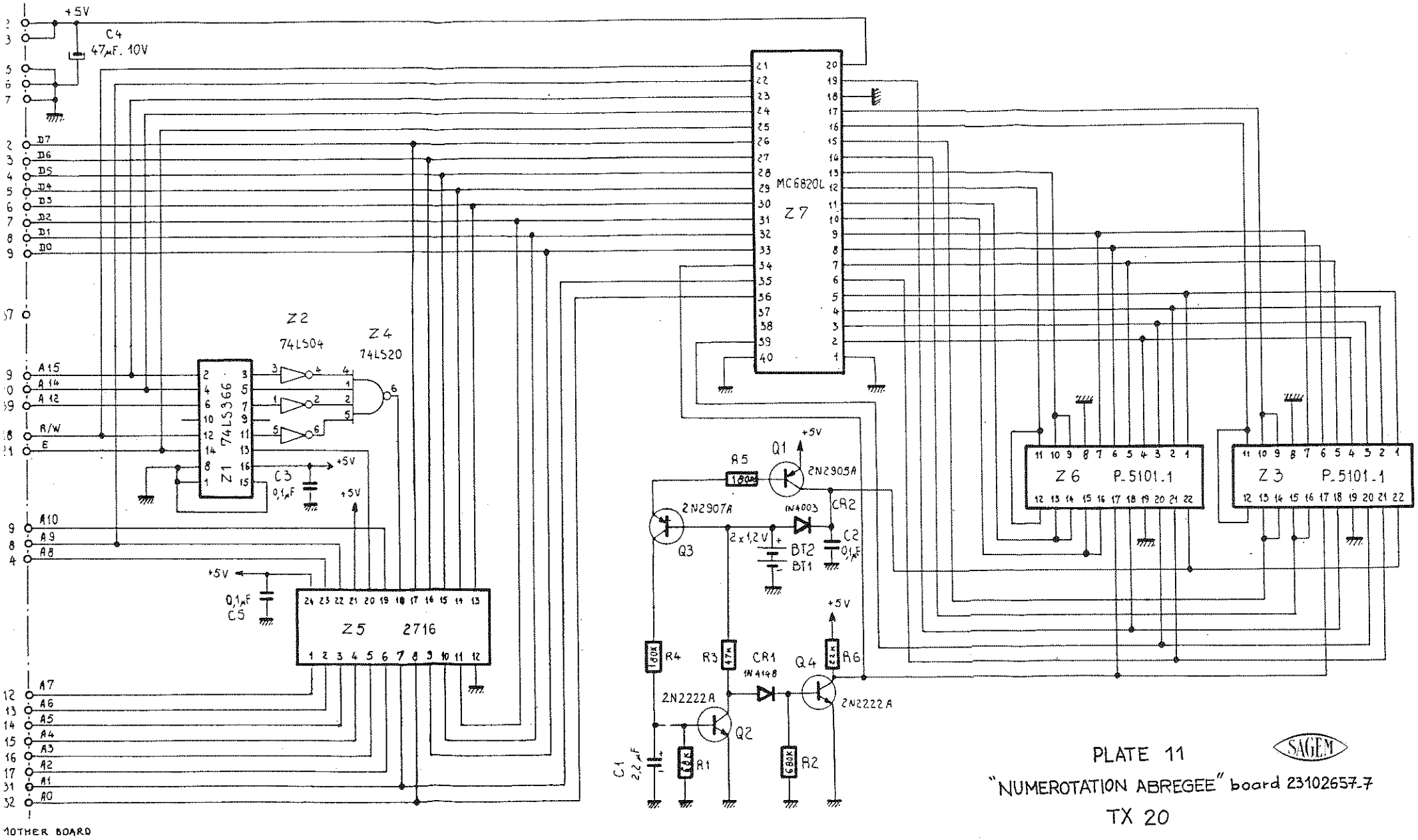


PLATE 11

"NUMEROTATION ABREGEE" board 23102657-7

TX 20

SAGEM

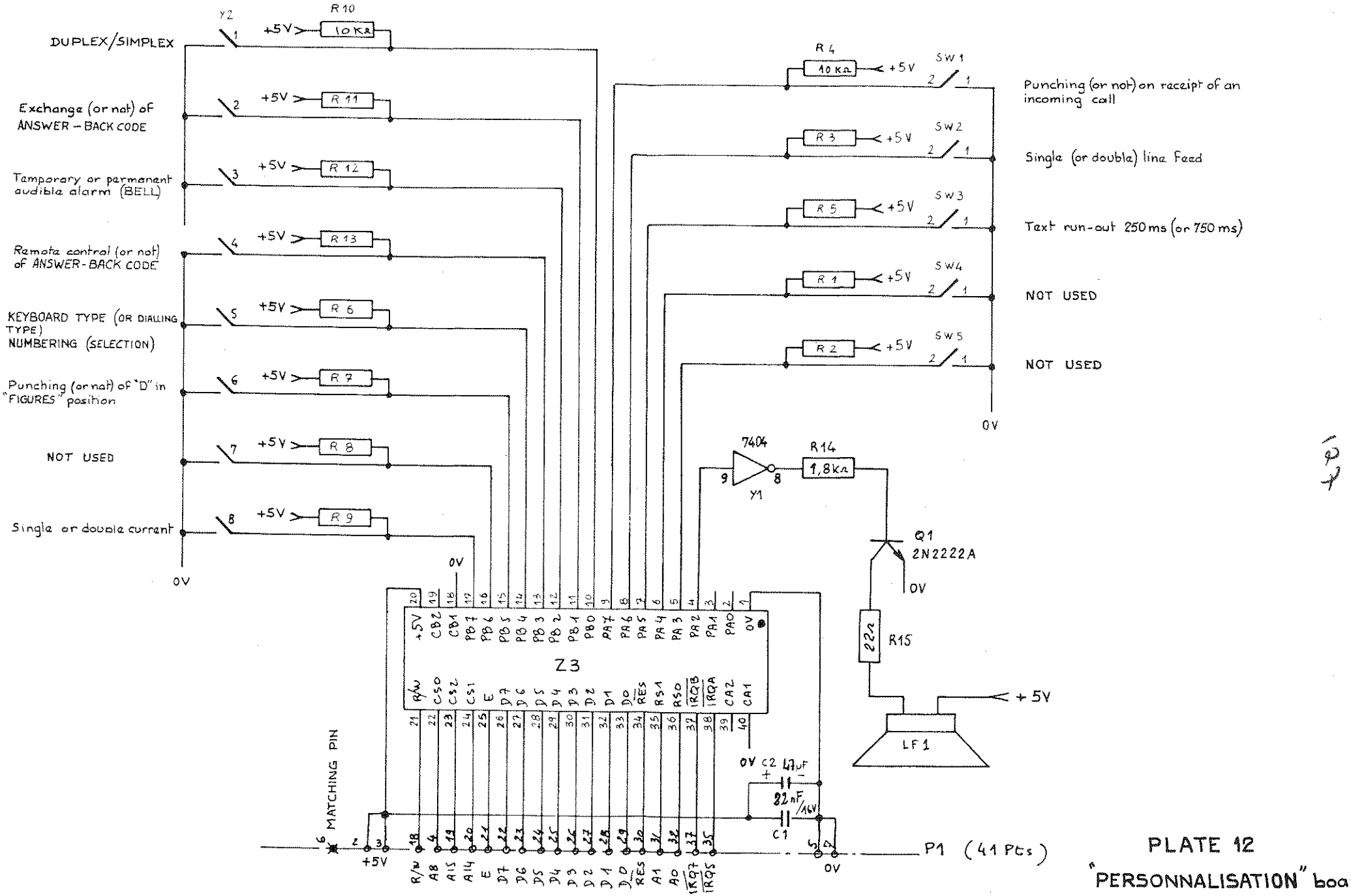


PLATE 12

"PERSONNALISATION" boa

TX 20

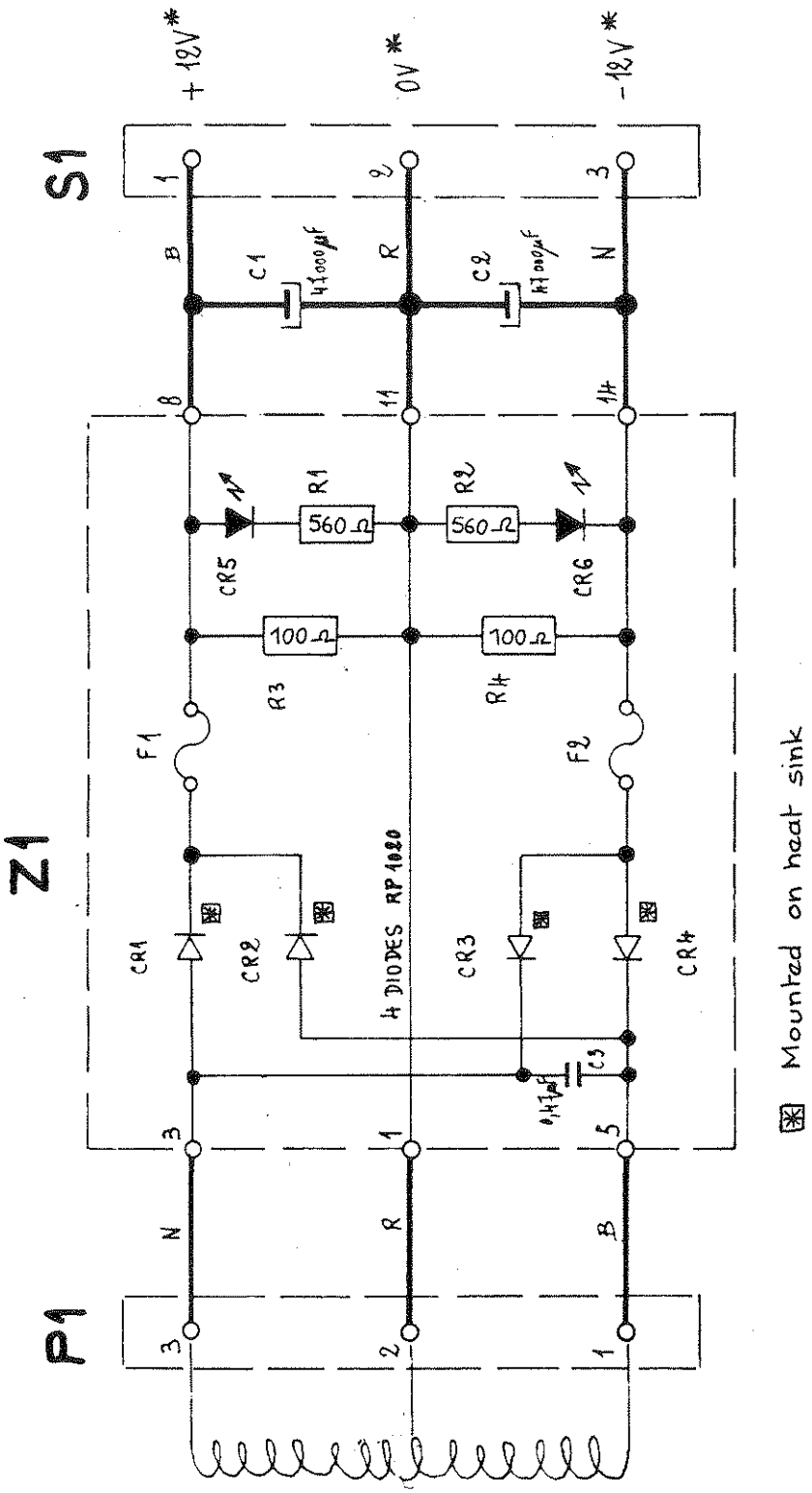


PLATE 13

± 12V POWER SUPPLY

TX 20

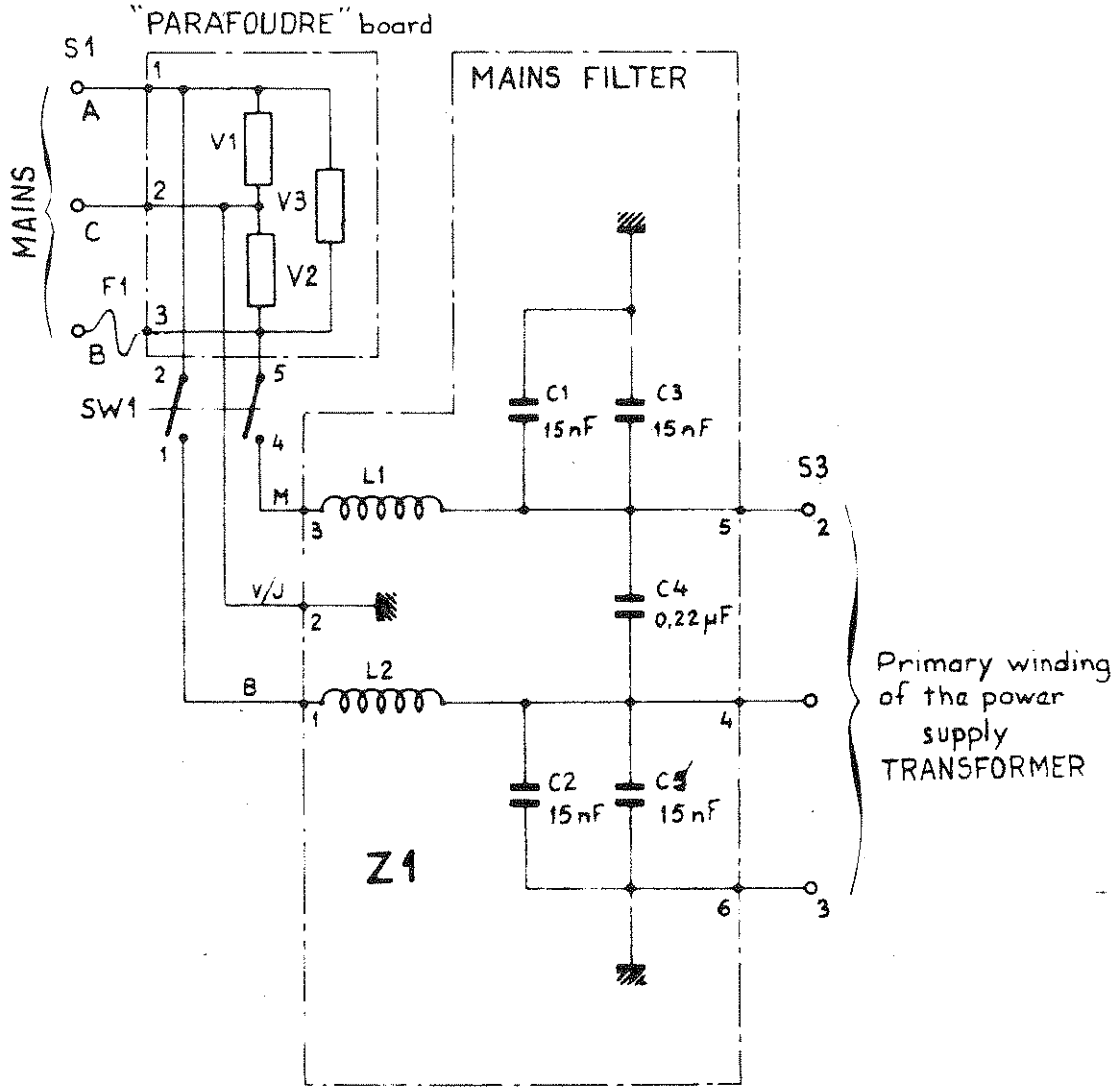


PLATE 14-1

MAINS FILTER 23074393-4
AND "PARAFOUDRE" BOARD

TX 20

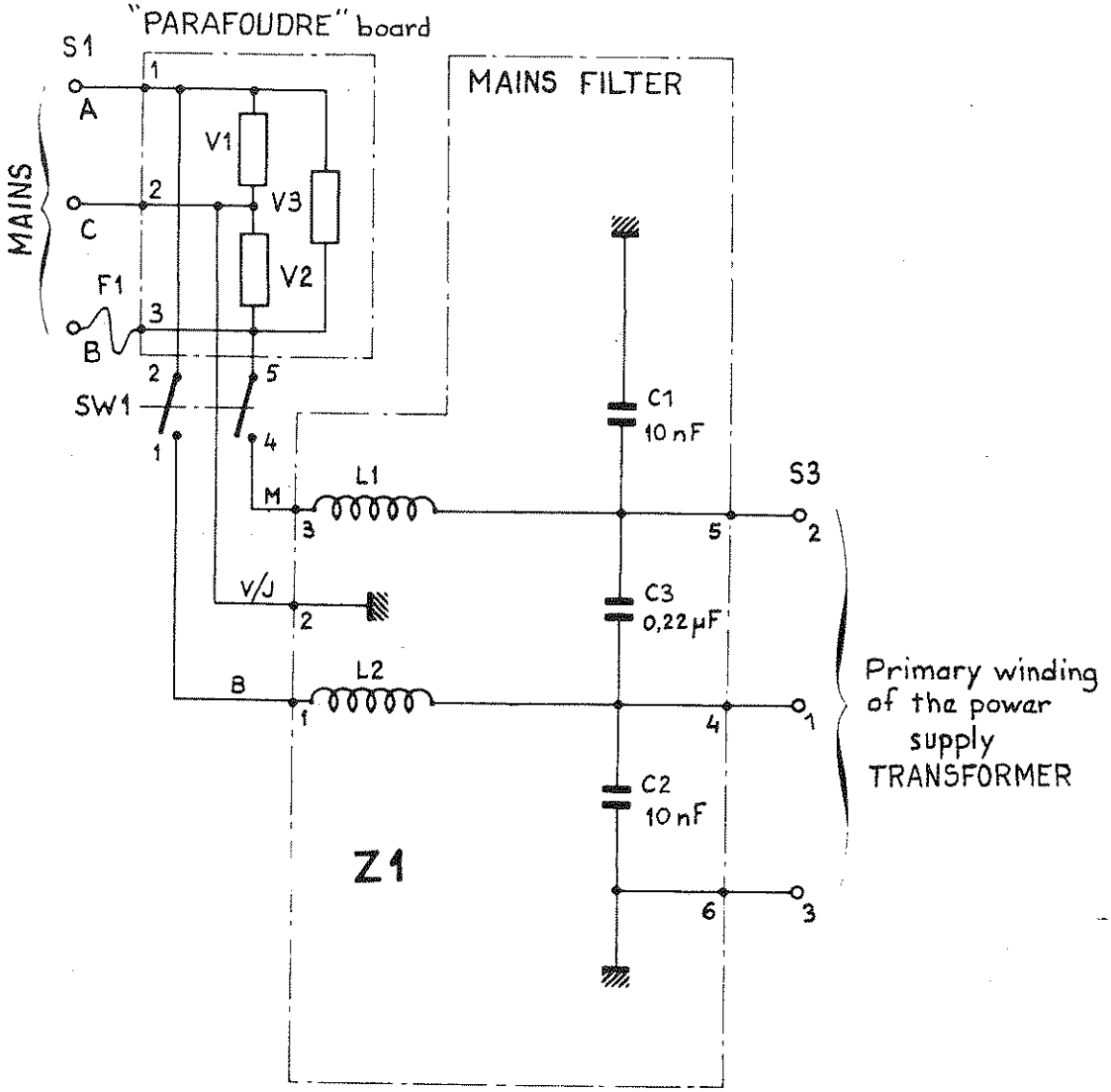


PLATE 14_2

MAINS FILTER 23100200-6
AND "PARAFOUDRE" BOARD

TX 20

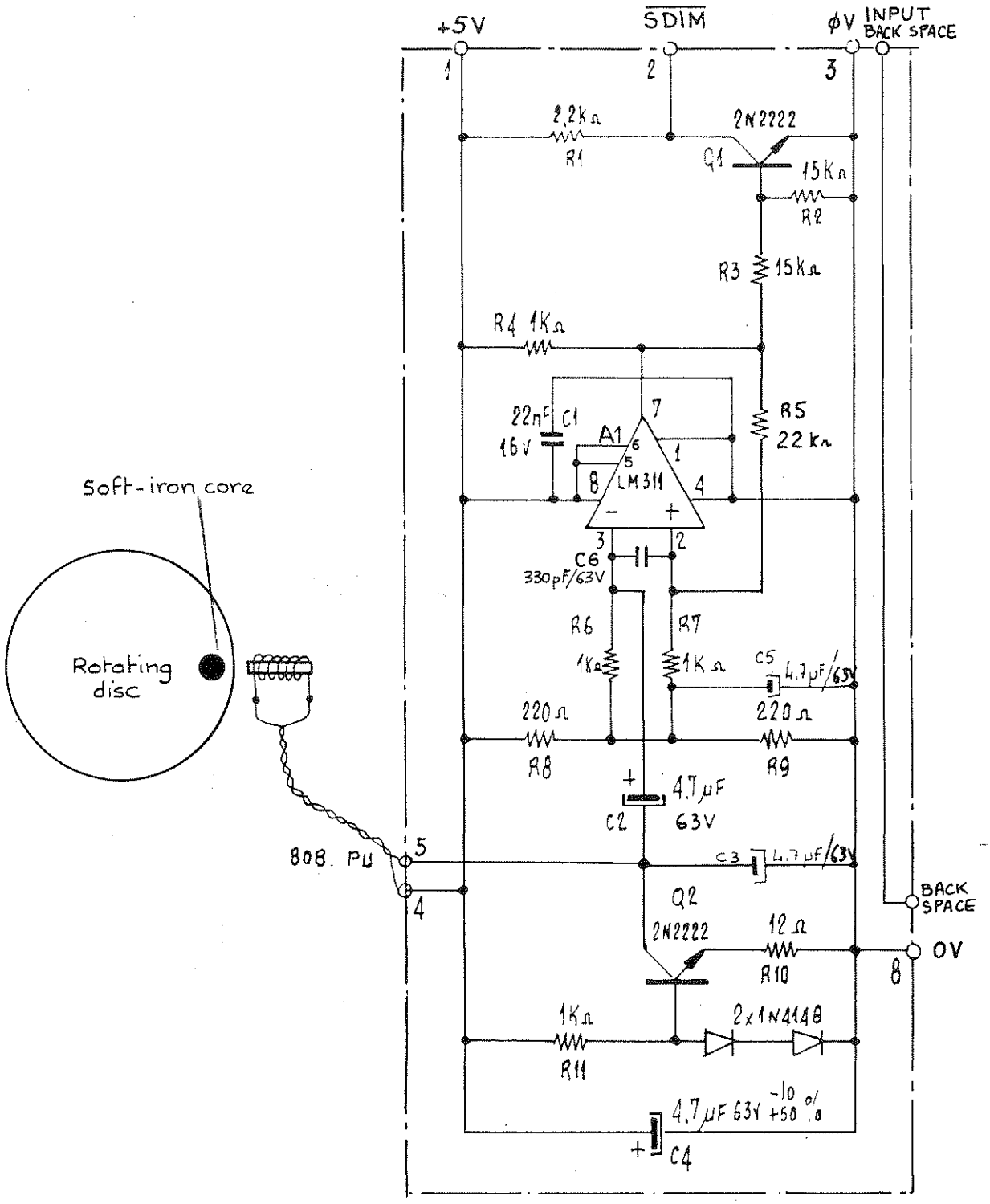


PLATE 15

SYNCHRONIZATION DEVICE (TAPE PUNCH)

TX 20

3

ILLUSTRATED PARTS CATALOGUE

FOREWORD

1- DOCUMENT COMPOSITION

The present document includes :

- a «WORKSHOP» illustrated parts list,
- an Index of the SAGEM code numbers,
- an Index of the Manufacturer's references,
- an Index of Manufacturers.

2- SPLITTING OF THE «WORKSHOP» ILLUSTRATED PARTS LIST

This section of the Document includes :

- a plate 00 (zéro) with its text ; this Plate shows the various assemblies likely to be removed in situ,
- following the Plate 00, there are detail Plates with their texts ; these Plates show the various items likely to be removed or disassembled in the workshop.

2.1 Plate 00 identification

On Plate 00, each main component is identified by an «item number» ; this item number is also the number of the Plate on which the main component is then detailed.

Example : The item No. 4 on Plate 00 refers to the detail Plate No. 4.

When a main component has several variants, it is identified on Plate 00 with a same item number followed by an alphabetical index proper to each variant. The item number together with the alphabetical index then forms the number of the corresponding detail Plate.

The components identified on Plate 00 by an item number higher than 50 have no detail Plates.

In the text, some items have their item number preceded by a dash ; in that case, the item is not located on the Plate.

The components which are marked on Plate 00 are not mentioned again on heading of the corresponding detail Plates.

2.2 Identification of detail Plates

The detail Plate number is the same as the item number which identifies the main component on Plate 00.

3- HOW TO USE THE PRESENT DOCUMENT

1st case :

Knowing an item by its SAGEM Code No., refer to the list : «INDEX OF THE SAGEM CODE NUMBERS». This list gives, according to the Code number of an item (column 1), the position of this item in the illustrated parts list (column 2 : Section, Plate, Item No.), the quantity (column 3), the Manufacturer's reference (column 4), and the code of its Manufacturer (column 5, See Note 1).

2nd case :

Knowing an item by its Manufacturer's reference, refer to the list : «INDEX OF THE MANUFACTURER'S REFERENCES». This list gives, according to the Manufacturer's reference of an item (column 1), the code of its Manufacturer (column 2, See Note 1), the position of this item in the illustrated parts list (column 3 : Section, Plate, Item No.), the quantity (column 4), and the SAGEM corresponding code (column 5).

3rd case :

Knowing an item by its position on equipment :

- seek out the item No. of the main corresponding component, by consulting the Plate 00,
- refer to the corresponding detail Plate ; the text facing the Plate gives, for each reference number of each item (column 1, see NOTE 2), its code number (column 2), its description and its circuit reference (column 3), its Manufacturer's reference and the code of its Manufacturer (column 4, see NOTE 1) and its quantity (column 5).

NOTE 1 : Refer to the «INDEX OF MANUFACTURERS» which gives, according to the Manufacturer's code (column 1), the name and address of Manufacturer (column 2).

NOTE 2 : Electric and electronic components having a circuit reference code, are identified by this code in Plate and text (2nd line of column 3).

4- REPRESENTATION OF RELATIONSHIP BETWEEN ITEM AND ASSEMBLY

The notion of an item belonging to an assembly appears in the text according to the following principle :

- an item belongs to the assembly immediately «uper», whose description is shifted by one row to the left,
- an assembly includes all of the items or assemblies immediately «lower», whose description is shifted by one row to the right.

The attaching items are not illustrated and have no special item number. They appear in the text immediately belows the item they attach, and in the same row as this item.

5- SIGNS AND ABBREVIATIONS

— PM («POUR MEMOIRE»)

This indicates that the item is to be found in a preceding list (also including in field maintenance manual).

— SB («SUIVANT BESOIN»)

This indicates that the quantity required can only be determined when carrying out maintenance or adjustements.

_ ******

This sign in column 2 of parts list means that no spare is provided for this component.

-(R1) A (R4)

Mention in french whose translation is : (R1) TO (R4).

6- ORDER FOR REPLACEMENT PARTS

When ordering a part, please indicate :

- machine name, its reference and serial number (on name plate),
- the part name
  e.g. : «SPRING»
- the code number, with its key
  e.g. : «23008560-6»

Orders and all related correspondance (enquiries, concerning bills, delivery dates, etc.) should be addressed to :

SAGEM
DÉPARTEMENT TÉLEX ET BUREAUTIQUE
Service Pièces Détachées
6, avenue d'Iéna
75783 - PARIS-CEDEX 16
Téléphone : 291.20.20 - Télex : 614520F - SAGEM PARIS

Urgent orders may be telephoned or (preferably) telexed to the same address.

3-1

ILLUSTRATED PARTS LIST

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23075300		Memory program 23080967-0	-				
23082130-3		New memory program 23082132-4					
23083000-0		New memory program 23082962-2					
	1	Metal operators panel latch replaced by a plastic one	00				
	3	To introduce SAGEM's motor	00			22000	
	8	Increase insulation of mains wiring					
	15	Change line cord terminating pin					
	18	Operator panel : Plastic designation strip and new glue					
	24	New key board with low keys	00				
	32	New clamp on sensor	00				

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23083000-0	38	Addition of line protection unit 23117527-1	-			45816	
	40	New sensor 23115293-4	00				
23106470-4		New memory program 23106465-0					
23108530-7		New memory program 23108527-9					
23115610-1	44	New memory program (7K) 23115601-5 and transcodeur 23105193-4	-			37969	
23116870-5	46	New "RAM + RPROM" Board 8K 23101491-5 logicial 23115601-5 Transcodeur 23105193-4	00			37969	
	48	"Alimentation" Board 23117707-2	00			49151	
	60	Protection module 23118038-9. Addition of a fuse on all transformer outputs	00				
	63	New "Printer" board 23117644-2	00				

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23116870-5	65	Line protection module add gas arrestors 23117527-1 to 23118719-8	00				
	66	New transformer 23118882-2	00				
	71	New "Alimentation" board 23118723-9					
23128390-3	77	New "RAM + RPROM" board 8K 23118714-3	00				
	82	New "PIA PERFO + AMPLI" board 23119272-7	00				
	83	Advance paper : Improvement of the rigidity					

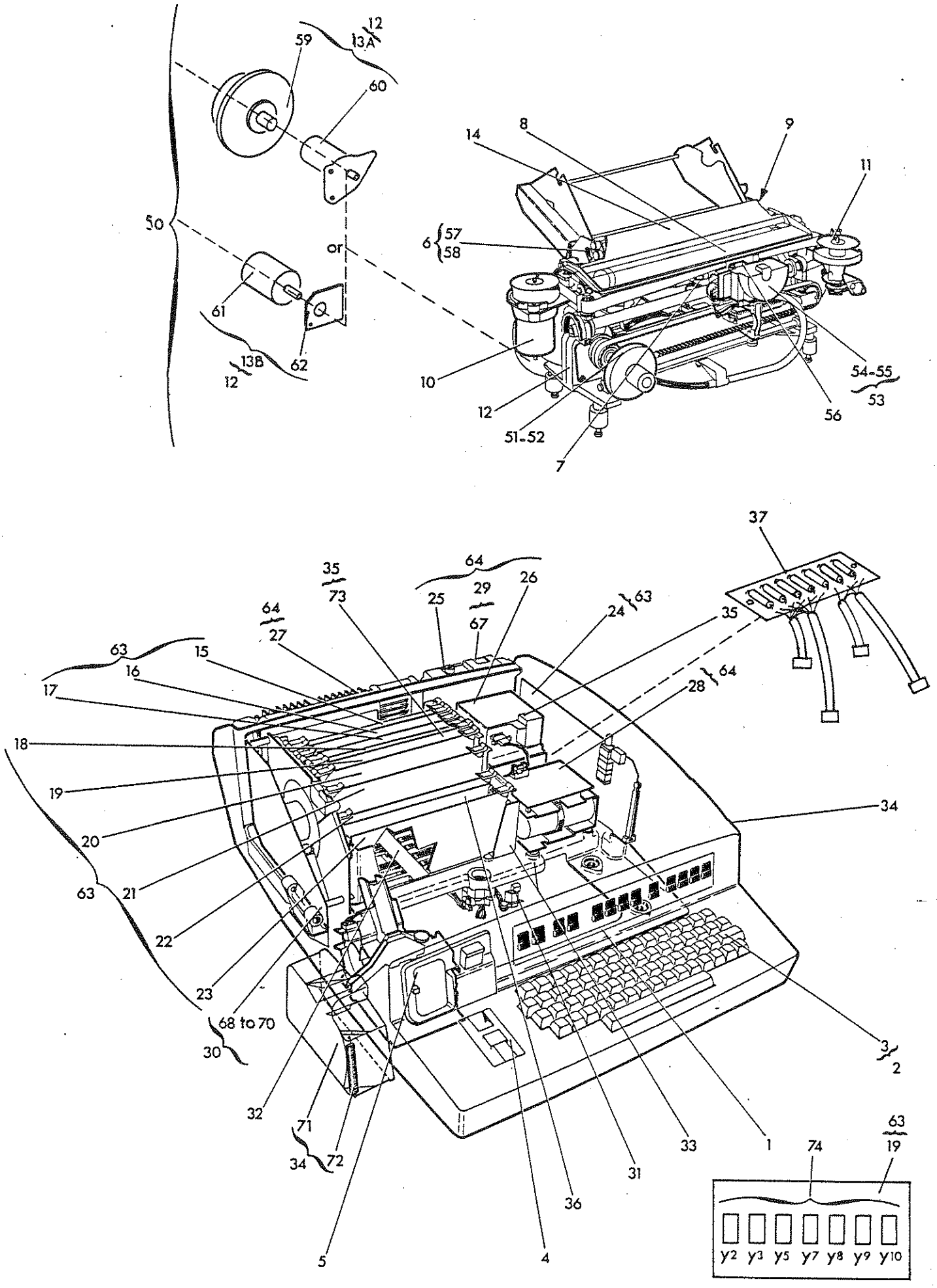


PLATE 00 TELEPRINTER TX20

1	2	3 1 2 3 4 5 6 7	4		5
	**********	TELEPRINTER TX20 (WITHOUT LOGICIAL)	**********		01
1	23074375-7	. OPERATIONAL CONSOLE	23074375-7	53840	01
	23075139-5	. STRIP	23075139-5	53840	01
2A	23074795-8	. KEYBOARD	23074795-8	53840	01
3A	**********	. . CARD KEYBOARD	**********		01
2B	23126742-5	. KEYBOARD	23126742-5	53840	01
3B	**********	. . CARD KEYBOARD	**********	53840	01
4A	23074946-5	. TAPE READER	23074946-5	53840	01
4B	23075697-3	. TAPE READER (WITH TIGHT TAPE DETECTOR)	23075697-3	53840	01
5	23074900-1	. TAPE PUNCH	23074900-1	53840	01
50	23075076-5	. PRINTER	23075076-5	53840	01
	15621044-0	. SCREW C M5X12	E27115C50Q12QEUL	50035	04
51A	23075926-3	. . SENSOR	23075926-3	53840	01
	23074596-2	. . SENSOR FIXING SCREW	23074596-2	53840	01
52	23058757-6	. . CLAMP	23058757-6	53840	01
	15600058-4	. . SCREW CHC M3X16	E27161-30M16QVUL	50035	01
51B	23115293-4	. . SENSOR	23115293-4	53840	01
	23074596-2	. . SENSOR FIXING SCREW	23074596-2	53840	01
52	23058757-6	. . CLAMP	23058757-6	53840	01
	15600058-4	. . SCREW CHC M3X16	E27161-30M16QVUL	50035	01
	23108076-1	. . . SENSOR	23108076-1	53840	01
	23105811-0	. . . CABLE	23105811-0	53840	01
	23109228-7	. . . BRACKET	23109228-7	53840	01
53	23075077-3	. . PRINTING HEAD	23075077-3	53840	01
54	23075238-9	. . . COVER	23075238-9	53840	01
55	23075260-2	. . . INDEX	23075260-2	53840	01
	15690116-6	. . . SCREW CL N02-4.5	E27131-2P45EDTF	50035	01
56	23059763-4	. . CLAMP	23059763-4	53840	01
	15600048-0	. . SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
6	23074800-9	. . PAPER ADVANCE	23074800-9	53840	01
57	23075078-6	. . . PAPER LOW SWITCH AND CORD ASSEMBLY	23075078-6	53840	01
58	23073797-3	. . . SCREW-TAPPED PLATE	23073797-3	53840	01
	15620977-3	. . . SCREW C M2X10	E27115C20Q10CAUP	50035	02
7	23074400-1	. . PRESSURE ROLLERS	23074400-1	53840	01
	15600052-1	. . SCREW CHC M3X10	E27161-30Q10QVUL	50035	02
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	02
8	23074750-2	. . PLATEN	23074750-2	53840	01
	23058916-1	. . CLAMP	23058916-1	53840	02
	15600274-9	. . SCREW CHC M3X20	E27161-30M20QVUL	50035	02
9	23059348-8	. . LINE FEED MOTOR	23059348-8	53840	01
	15600050-0	. . SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	02
10	23079024-3	. . RIBBON ASSEMBLY (LEFT)	23079024-3	53840	01
	15600050-0	. . SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	01
11	23079153-9	. . RIBBON ASSEMBLY (RIGHT)	23079153-9	53840	01
	15600143-7	. . SCREW CHC M3X12	E27161-30Q12QVUL	50035	02
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	02
12	**********	. . PRINTING FRAME	**********		01
13A	23108436-8	. . . DRIVE MOTOR WITH BEARING ASSEMBLY	23108436-8	53840	01
59	23079764-3	. . . . DRIVE MOTOR	23079764-3	53840	01
	15600050-0	. . . . SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
	15700257-4	. . . . WASHER M3U	E27611M30AAUL	50035	01

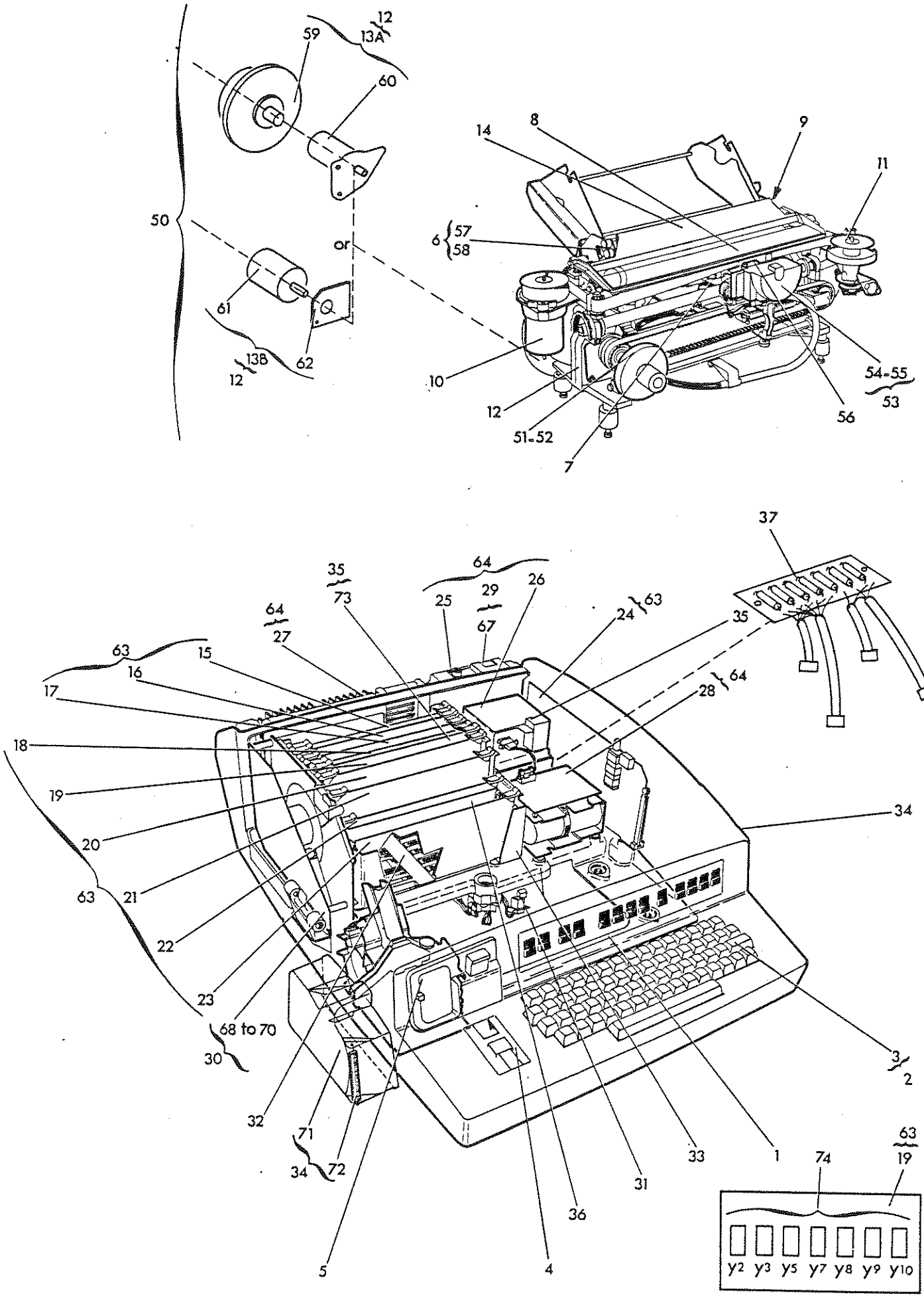


PLATE 00 TELEPRINTER TX20

1	2	3 1 2 3 4 5 6 7	4		5
60	23079763-0	. . . . BEARING ASSEMBLY	23079763-0	53840	01
	15600052-1	. . . . SCREW CHC M3X10	E27161-30Q10QVUL	50035	02
	15700257-4	. . . . WASHER M3U	E27611M30AAUL	50035	02
13B	23108437-1	. . . DRIVE MOTOR WITH SUPPORT BRACKET	23108437-1	53840	01
	15600050-0	. . . SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
61	23077774-5	. . . . MOTOR CABLE	23077774-5	53840	01
62	23076643-7	. . . . BRACKET	23076643-7	53840	01
14	**********	. . MISCELLANEOUS EQUIPMENTS (TELEPRINTER) ...	**********		01
	**********	. MAIN BASE ASSEMBLY	**********		01
63	**********	. . ELECTRONIC BOARDS	**********		01
15A	23074407-2	. . . "ALIMENTATION" BOARD	23074407-2	53840	01
15B	23117707-2	. . . "ALIMENTATION" BOARD	23117707-2	53840	01
15C	23118723-9	. . . "ALIMENTATION" BOARD	23118723-9	53840	01
16	23074415-5	. . . "ASSERVISSEMENT" BOARD	23074415-5	53840	01
17A	23074352-5	. . . "PIA IMP" BOARD	23074352-5	53840	01
17B	23117644-2	. . . "PIA IMP" BOARD	23117644-2	53840	01
18	23074667-0	. . . "PIA ERD+IT/ADA" BOARD	23074667-0	53840	01
19	23073206-9	. . . "PIA LECTEUR+AMPLI" BOARD (WITHOUT .... INTEGRATED CIRCUIT)	23073206-9	53840	01
20A	23074345-0	. . . "PIA CLAVIER+MPU" BOARD	23074345-0	53840	01
20B	23077489-3	. . . "PIA CLAVIER+MPU" BOARD	23077489-3	53840	01
20C	23106892-6	. . . "PIA CLAVIER+MPU" BOARD	23106892-6	53840	01
21A	23074438-7	. . . "RAM+RPROM" BOARD (WITHOUT MEMORIES) ..	23074438-7	53840	01
21B	23101491-5	. . . "RAM+RPROM" BOARD (WITHOUT MEMORIES) ..	23101491-5	53840	01
21C	23118714-3	. . . "RAM+RPROM" BOARD (WITHOUT MEMORIES) ..	23118714-3	53840	01
22A	23073040-3	. . . "PIA PERFO+AMPLI" BOARD	23073040-3	53840	01
22B	23119272-7	. . . "PIA PERFO+AMPLI" BOARD	23119272-7	53840	01
23	23074359-6	. . . "PERSONNALISATION" BOARD	23074359-6	53840	01
24	**********	. . . "ADAPTATION" BOARD (REFER TO SPECIFIC . TECHNICAL)	**********		01
64	**********	. . POWER SUPPLY DEVICES	**********		01
25A	23074393-4	. . . MAINS FILTER	23074393-4	53840	01
	23100155-9	. . . . SCREW M3X25	23100155-9	53840	03
	15700100-1	. . . . WASHER DE3	E27168E30AXTL	50035	03
25B	23100200-6	. . . MAINS FILTER	23100200-6	53840	01
	23100155-9	. . . . SCREW M3X25	23100155-9	53840	03
	15700100-1	. . . . WASHER DE3	E27168E30AXTL	50035	03
- 65	13270088-7	. . . . FUSE CARTRIDGE 1.25A	HA20-1U25	52745	01
	13270072-0	. . . . FUSE CARTRIDGE 0.8A	HA20U8	52745	01
	23100384-2	. . . . WASHER	23100384-2	53840	03
26A	23076906-6	. . . TRANSFORMER	23076906-6	53840	01
	15700315-4	. . . WASHER DD4	E27618D40AXTL	50035	04
	15500022-0	. . . NUT H M4	E27411A40QQFUL	50035	04
26B	23118882-2	. . . TRANSFORMER	23118882-2	53840	01
	15700315-4	. . . WASHER DD4	E27618D40AXTL	50035	04
	15500022-0	. . . NUT H M4	E27411A40QQFUL	50035	04
26C	23142688-9	. . . TRANSFORMER (04-001-96) C.I	23142688-9	53840	01
	15700315-4	. . . WASHER DD4	E27618D40AXTL	50035	04
	15500022-0	. . . NUT H M4	E27411A40QQFUL	50035	04
37	23118038-9	. . . PROTECTION MODULE	23118038-9	53840	01
	15600048-0	. . . SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
27	23074188-6	. . . POWER AMPLIFIER	23074188-6	53840	01
	15600062-5	. . . SCREW CHC M3X25	E27161-30M25QVUL	50035	03
28	23079150-0	. . . +- 12V POWER SUPPLY	23079150-0	53840	01
- 66	13271069-3	. . . . FUSE CARTRIDGE 10A	HA20-10U	52745	02
- 29	**********	. . . "PARAFOUDRE" ASSEMBLY	**********		01
67	23074967-6	. . . . "PARAFOUDRE" BOARD	23074967-6	53840	01
30	23074501-1	. . TAPE STORE	23074501-1	53840	01
	15600143-7	. . SCREW CHC M3X12	E27161-30Q12QVUL	50035	02

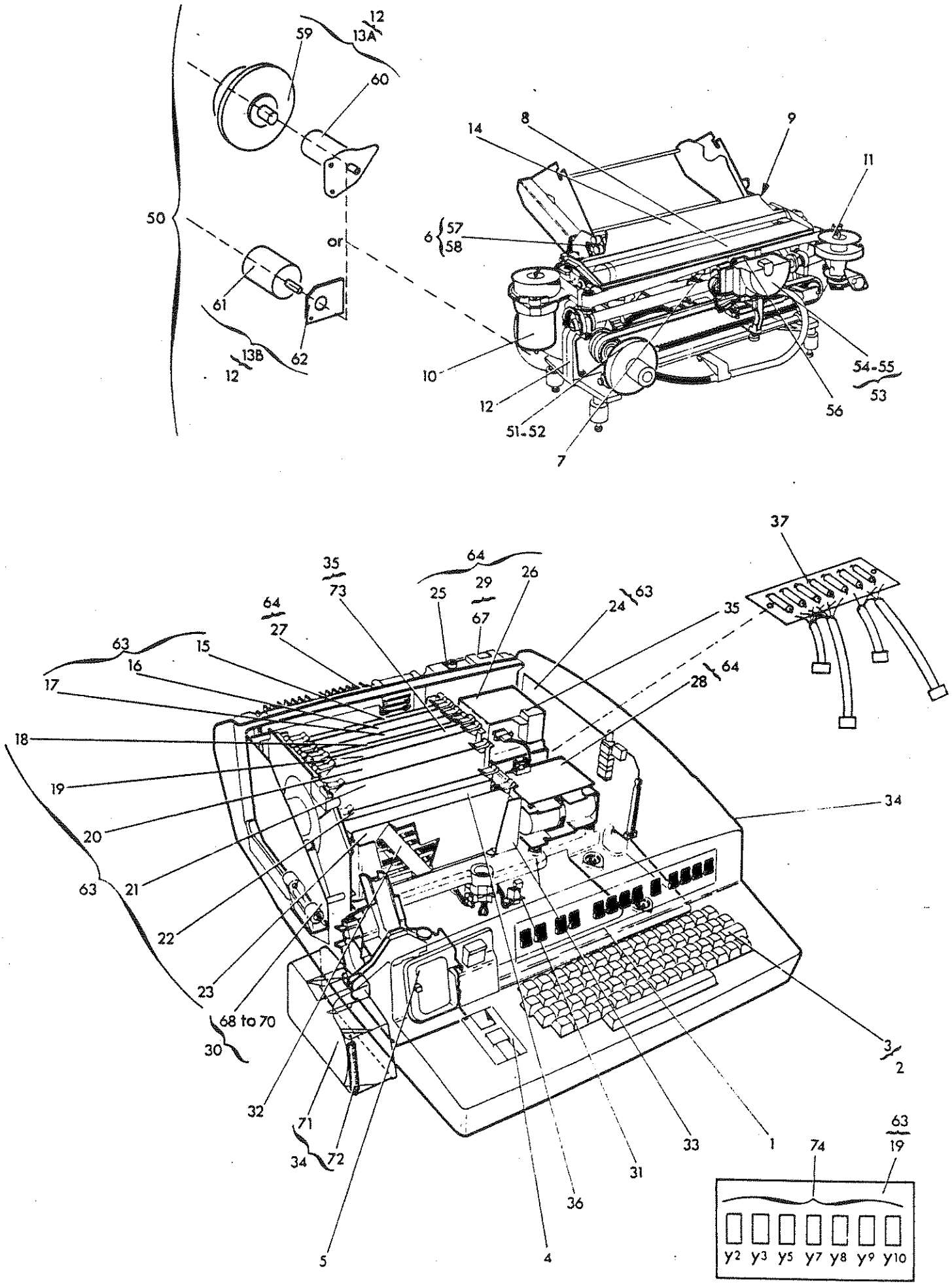
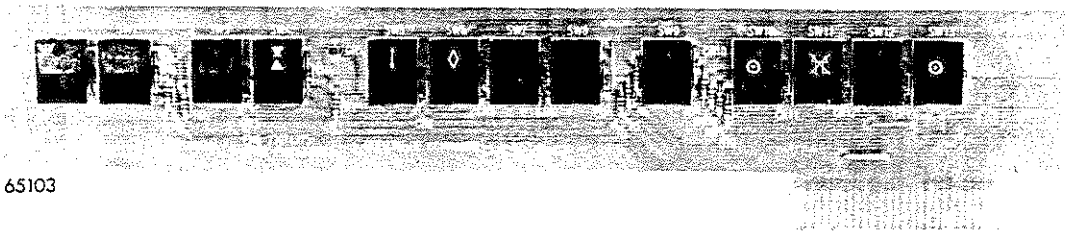


PLATE 00 TELEPRINTER TX20

1	2	3 1 2 3 4 5 6 7	4		5
68	23074527-7	. . . TAPE LOW SNITCH AND CORD ASSEMBLY	23074527-7	53840	01
69	23074726-8	. . . CLAMP	23074726-8	53840	01
70	23073797-3	. . . SCREW-TAPPED PLATE	23073797-3	53840	01
	15621022-6	. . . SCREW C M2X10	E27115C20Q10QEUL	50035	02
31	**********	. . WIRING HARNESS	**********		01
	15600050-0	. . SCREW CHC M3X8	E27161-30Q8QVUL	50035	07
	15700257-4	. . WASHER M3U	E27611M30AAUL	50035	03
32	23100333-4	. . MAIN BASE	23100333-4	53840	01
33	**********	. . MISCELLANEOUS EQUIPMENTS (MAINS BASE)	**********		01
34	**********	. COVER	**********		01
71	23079306-2	. . CHAD BOX	23079306-2	53840	01
72	23079699-8	. . SPRING	23079699-8	53840	01
35	**********	. MISCELLANEOUS EQUIPMENTS (TELEPRINTER WITHOUT LOGICIAL)	**********		01
73	**********	. . INTEGRATED CIRCUIT (ANSWERBACK PROM) OF .. BOARD ITEM 19 (REFERENCE WRITTEN ON ITEM)	**********		01
74	**********	PROMS'SET (BOARD ITEM 21) (REFERENCES WRITTEN ON ITEM)	**********		01
75	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y2	**********		01
76	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y3	**********		01
77	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y5	**********		01
78	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y7	**********		01
79	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y8	**********		01
80	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y9	**********		01
81	**********	. INTEGRATED CIRCUIT(REFERENCE WRITTEN ON ITEM) Y10	**********		01
- 82	23100262-6	MAINS CABLE	23100262-6	53840	01
36	23102657-7	"NUMEROTATION ABREGEE" BOARD (OPTIONAL)	23102657-7	53840	01
- 83	23118719-8	LINE PROTECTION (SEE TECHNICAL SHEET)	23118719-8	53840	01



65103

PLATE 1 OPERATIONAL CONSOLE

1	2	3 1 2 3 4 5 6 7	4		5
1	14019002-2	DIODE CR01	1N4148	52745	01
5	14019002-2	DIODE CR02	1N4148	52745	01
10	14019002-2	DIODE CR03	1N4148	52745	01
15	14019002-2	DIODE CR04	1N4148	52745	01
20	14239025-8	DIODE LED GREEN CR05	LED37B	56876	01
25	14019002-2	DIODE CR06	1N4148	52745	01
30	14019002-2	DIODE CR07	1N4148	52745	01
35	14019002-2	DIODE CR08	1N4148	52745	01
40	14019002-2	DIODE CR09	1N4148	52745	01
45	14019002-2	DIODE CR10	1N4148	52745	01
50	14019002-2	DIODE CR11	1N4148	52745	01
55	14019002-2	DIODE CR12	1N4148	52745	01
60	14019002-2	DIODE CR13	1N4148	52745	01
65	14019002-2	DIODE CR14	1N4148	52745	01
70	14338215-6	RESISTOR 150 OHMS 0.25 WATT R01	RC2T150UJ	52745	01
75	14338215-6	RESISTOR 150 OHMS 0.25 WATT R02	RC2T150UJ	52745	01
80	14338215-6	RESISTOR 150 OHMS 0.25 WATT R03	RC2T150UJ	52745	01
85	14338215-6	RESISTOR 150 OHMS 0.25 WATT R04	RC2T150UJ	52745	01
90	14338215-6	RESISTOR 150 OHMS 0.25 WATT R05	RC2T150UJ	52745	01
95	14338215-6	RESISTOR 150 OHMS 0.25 WATT R06	RC2T150UJ	52745	01
100	14338215-6	RESISTOR 150 OHMS 0.25 WATT R07	RC2T150UJ	52745	01
105	14338215-6	RESISTOR 150 OHMS 0.25 WATT R08	RC2T150UJ	52745	01
110	14338215-6	RESISTOR 150 OHMS 0.25 WATT R09	RC2T150UJ	52745	01
115	14338215-6	RESISTOR 150 OHMS 0.25 WATT R10	RC2T150UJ	52745	01
120	13211814-6	PRESS BUTTON COLOUR BLACK WITH LED RED SW01	DMBNOIR	51241	01
125	23076147-9	ENGRAVED PRESS BUTTON WITHOUT LED SW02	23076147-9	53840	01
130	13211814-6	PRESS BUTTON COLOUR BLACK WITH LED RED SW03	DMBNOIR	51241	01
135	23075363-3	ENGRAVED PRESS BUTTON WITHOUT LED SW04	23075363-3	53840	01
140	23075364-6	ENGRAVED PRESS BUTTON WITHOUT LED SW05	23075364-6	53840	01
145	23075365-4	ENGRAVED PRESS BUTTON WITHOUT LED SW06	23075365-4	53840	01
150	13211814-6	PRESS BUTTON COLOUR BLACK WITH LED RED SW07	DMBNOIR	51241	01
155	13211814-6	PRESS BUTTON COLOUR BLACK WITH LED RED SW08	DMBNOIR	51241	01

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PLATE 1 OPERATIONAL CONSOLE

1	2	3 1 2 3 4 5 6 7	4		5
160	13211814-6	PRESS BUTTON COLOUR BLACK WITH LED RED SW09	DMBN0IR	51241	01
165	23075367-5	ENGRAVED PRESS BUTTON WITHOUT LED SW10	23075367-5	53840	01
170	23075366-7	ENGRAVED PRESS BUTTON WITHOUT LED SW11	23075366-7	53840	01
175	13211814-6	PRESS BUTTON COLOUR BLACK WITH LED RED SW12	DMBN0IR	51241	01
180	23075367-5	ENGRAVED PRESS BUTTON WITHOUT LED SW13	23075367-5	53840	01

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23074795-8	2	Addition of switch providing roll-over facility for two or more keys	-	23074365-8	D	5778	
	17	To strengthen the keys to have them less sensitive to the shocks	-	23074365-8	E	33200	
23126742-5	24	To equipe the keyboard with low keys	2B	23116241-4	-	52000	
	73	Add key to space bar	2B	23116241-4	A		

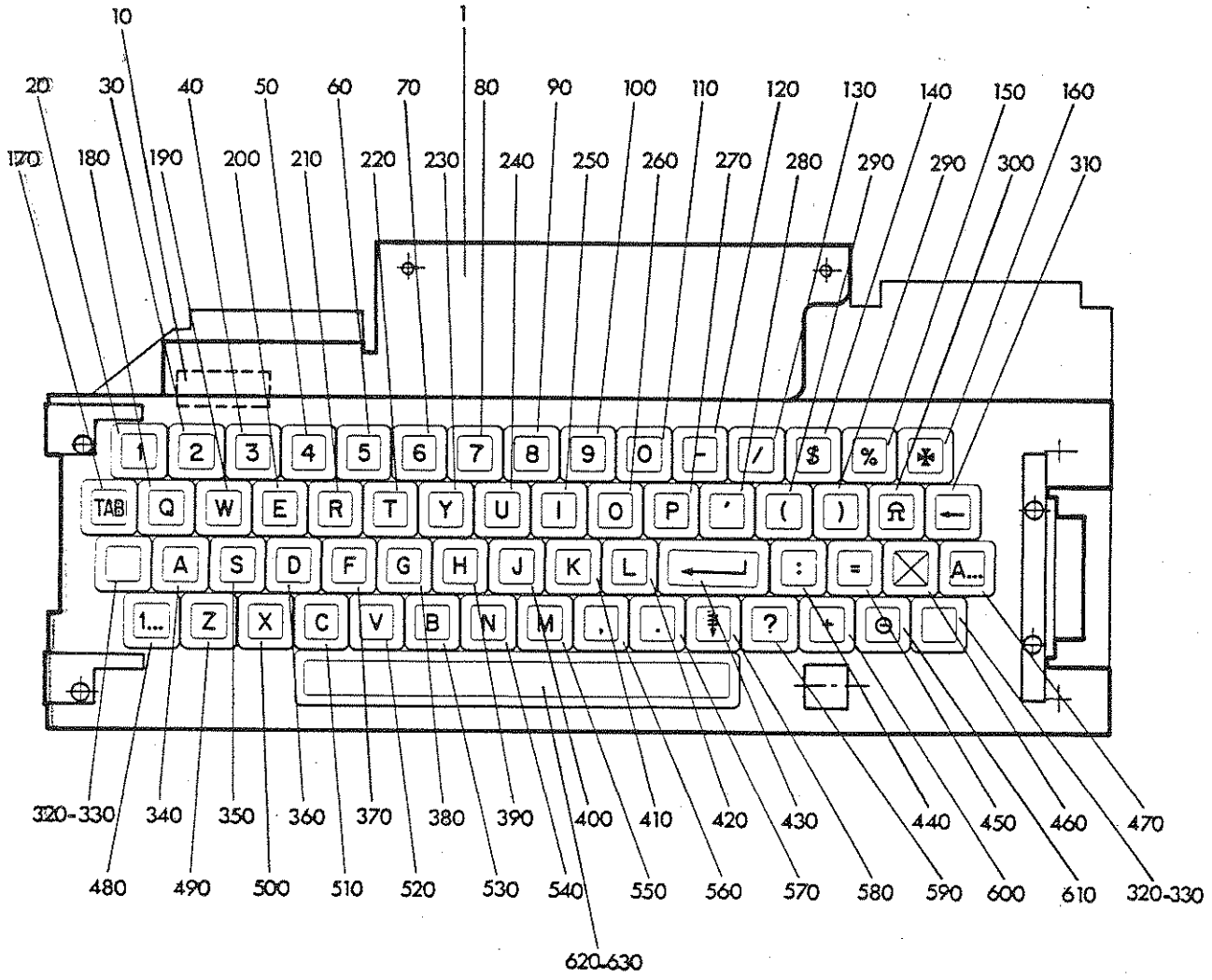


PLATE 2A KEYBOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	**********	PROTECTION PLATE	**********		01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
10	23075062-9	ROM	23075062-9	53840	01
20	23075459-4	KEYTOPS 1	23075459-4	53840	01
30	23075460-6	KEYTOPS 2	23075460-6	53840	01
40	23075461-9	KEYTOPS 3	23075461-9	53840	01
50	23075462-7	KEYTOPS 4	23075462-7	53840	01
60	23075463-0	KEYTOPS 5	23075463-0	53840	01
70	23075464-8	KEYTOPS 6	23075464-8	53840	01
80	23075465-1	KEYTOPS 7	23075465-1	53840	01
90	23075466-9	KEYTOPS 8	23075466-9	53840	01
100	23075467-2	KEYTOPS 9	23075467-2	53840	01
110	23075468-0	KEYTOPS ZERO	23075468-0	53840	01
120	23075500-9	KEYTOPS -	23075500-9	53840	01
130	23075502-0	KEYTOPS /	23075502-0	53840	01
140	23075514-5	KEYTOPS DOLLAR	23075514-5	53840	01
150	23075505-9	KEYTOPS %	23075505-9	53840	01
160	23075506-2	KEYTOPS "WHO ARE YOU"	23075506-2	53840	01
170	23075513-2	KEYTOPS TABULATE	23075513-2	53840	01
180	23075485-9	KEYTOPS Q	23075485-9	53840	01
190	23075491-1	KEYTOPS W	23075491-1	53840	01
200	23075473-4	KEYTOPS E	23075473-4	53840	01
210	23075486-2	KEYTOPS R	23075486-2	53840	01
220	23075488-3	KEYTOPS T	23075488-3	53840	01
230	23075493-2	KEYTOPS Y	23075493-2	53840	01
240	23075489-1	KEYTOPS U	23075489-1	53840	01
250	23075477-6	KEYTOPS I	23075477-6	53840	01
260	23075483-8	KEYTOPS O	23075483-8	53840	01
270	23075484-1	KEYTOPS P	23075484-1	53840	01
280	23075504-1	KEYTOPS '	23075504-1	53840	01
290	23075503-8	KEYTOPS (	23075503-8	53840	02
300	23075507-0	KEYTOPS BELL	23075507-0	53840	01
310	23075509-1	KEYTOPS CARRIAGE RETURN	23075509-1	53840	01
320	23075458-6	KEYTOPS NOT ENGRAVED	23075458-6	53840	02
330	13291489-0	BLOCKING RING	102795-00	54515	02
340	23075469-3	KEYTOPS A	23075469-3	53840	01
350	23075487-0	KEYTOPS S	23075487-0	53840	01
360	23075472-1	KEYTOPS D	23075472-1	53840	01
370	23075474-2	KEYTOPS F	23075474-2	53840	01
380	23075475-5	KEYTOPS G	23075475-5	53840	01
390	23075476-3	KEYTOPS H	23075476-3	53840	01
400	23075478-4	KEYTOPS J	23075478-4	53840	01
410	23075479-7	KEYTOPS K	23075479-7	53840	01
420	23075480-9	KEYTOPS L	23075480-9	53840	01
430	23075511-1	KEYTOPS NEW LINE	23075511-1	53840	01
440	23075497-4	KEYTOPS :	23075497-4	53840	01
450	23075501-7	KEYTOPS =	23075501-7	53840	01
460	23075516-6	KEYTOPS SPARE KEY	23075516-6	53840	01
470	23075515-3	KEYTOPS A	23075515-3	53840	01
480	23075510-3	KEYTOPS 1	23075510-3	53840	01
490	23075494-5	KEYTOPS Z	23075494-5	53840	01
500	23075492-4	KEYTOPS X	23075492-4	53840	01
510	23075471-3	KEYTOPS C	23075471-3	53840	01
520	23075490-3	KEYTOPS V	23075490-3	53840	01
530	23075470-0	KEYTOPS B	23075470-0	53840	01
540	23075482-0	KEYTOPS N	23075482-0	53840	01
550	23075481-7	KEYTOPS M	23075481-7	53840	01
560	23075496-6	KEYTOPS ,	23075496-6	53840	01
570	23075495-3	KEYTOPS .	23075495-3	53840	01
580	23075512-4	KEYTOPS LINE FEED	23075512-4	53840	01
590	23075498-7	KEYTOPS ?	23075498-7	53840	01
600	23075499-5	KEYTOPS +	23075499-5	53840	01
610	23075508-3	KEYTOPS BLANK TAPE	23075508-3	53840	01
620	23075457-3	KEYTOPS SPACE BAR	23075457-3	53840	01
630	13291494-4	PLUNGER RING	3220020	54515	02

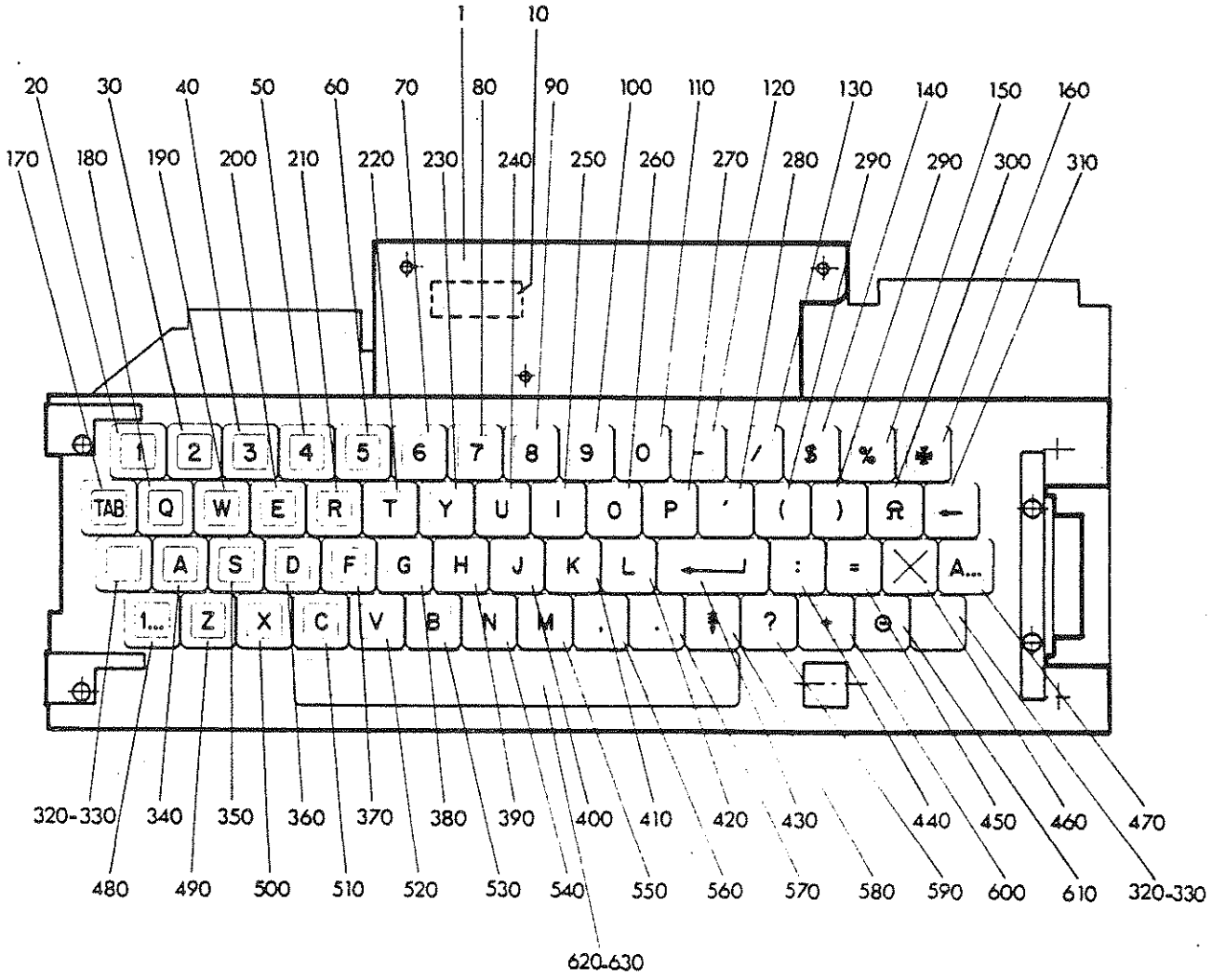
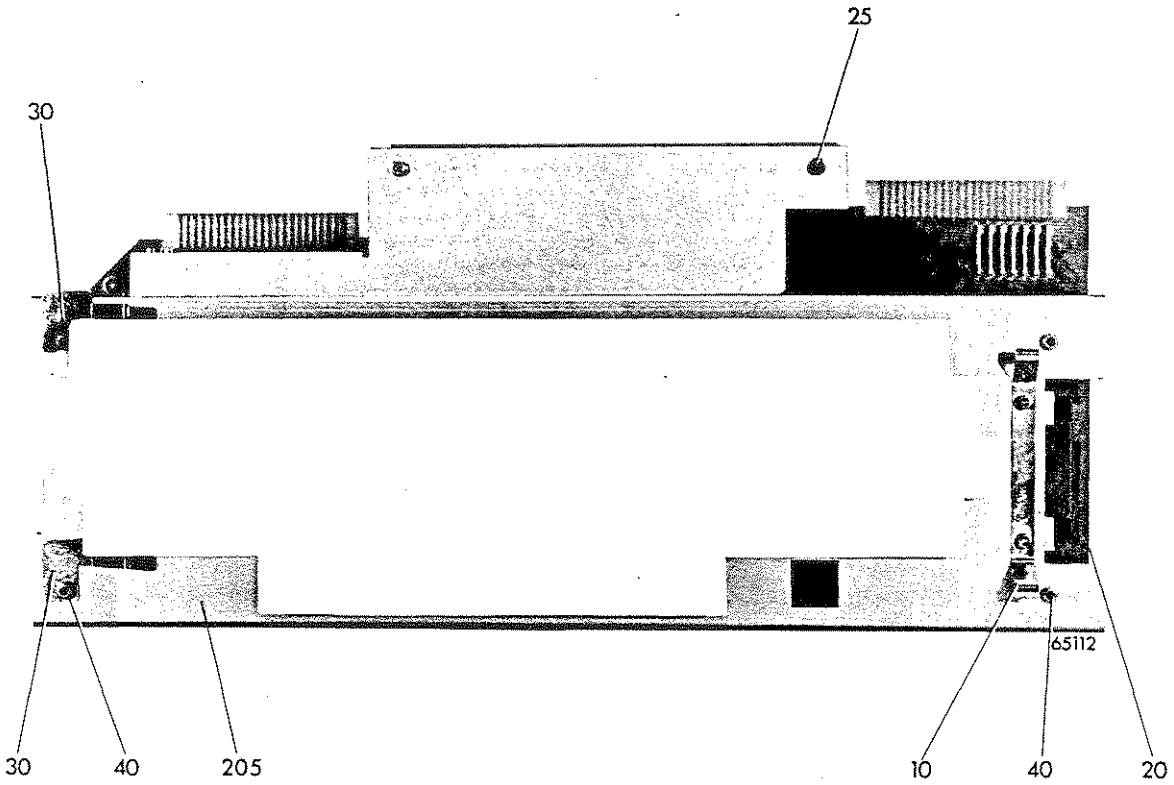


PLATE 2B KEYBOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	**********	PROTECTION PLATE	**********		01
10	23105193-4	ROM	23105193-4	53840	01
20	23075459-4	KEYTOPS 1	23075459-4	53840	01
30	23075460-6	KEYTOPS 2	23075460-6	53840	01
40	23075461-9	KEYTOPS 3	23075461-9	53840	01
50	23075462-7	KEYTOPS 4	23075462-7	53840	01
60	23075463-0	KEYTOPS 5	23075463-0	53840	01
70	23075464-8	KEYTOPS 6	23075464-8	53840	01
80	23075465-1	KEYTOPS 7	23075465-1	53840	01
90	23075466-9	KEYTOPS 8	23075466-9	53840	01
100	23075467-2	KEYTOPS 9	23075467-2	53840	01
110	23075468-0	KEYTOPS ZERO	23075468-0	53840	01
120	23075500-9	KEYTOPS -	23075500-9	53840	01
130	23075502-0	KEYTOPS /	23075502-0	53840	01
140	23075514-5	KEYTOPS DOLLAR	23075514-5	53840	01
150	23075505-9	KEYTOPS %	23075505-9	53840	01
160	23075506-2	KEYTOPS "WHO ARE YOU"	23075506-2	53840	01
170	23075513-2	KEYTOPS TABULATE	23075513-2	53840	01
180	23075485-9	KEYTOPS Q	23075485-9	53840	01
190	23075491-1	KEYTOPS W	23075491-1	53840	01
200	23075473-4	KEYTOPS E	23075473-4	53840	01
210	23075486-2	KEYTOPS R	23075486-2	53840	01
220	23075488-3	KEYTOPS T	23075488-3	53840	01
230	23075493-2	KEYTOPS Y	23075493-2	53840	01
240	23075489-1	KEYTOPS U	23075489-1	53840	01
250	23075477-6	KEYTOPS I	23075477-6	53840	01
260	23075483-8	KEYTOPS O	23075483-8	53840	01
270	23075484-1	KEYTOPS P	23075484-1	53840	01
280	23075504-1	KEYTOPS '	23075504-1	53840	01
290	23075503-8	KEYTOPS (	23075503-8	53840	02
300	23075507-0	KEYTOPS BELL	23075507-0	53840	01
310	23075509-1	KEYTOPS CARRIAGE RETURN	23075509-1	53840	01
320	23075458-6	KEYTOPS NOT ENGRAVED	23075458-6	53840	02
330	13291841-3	BLOCKING RING	105014-00	54515	02
340	23075469-3	KEYTOPS A	23075469-3	53840	01
350	23075487-0	KEYTOPS S	23075487-0	53840	01
360	23075472-1	KEYTOPS D	23075472-1	53840	01
370	23075474-2	KEYTOPS F	23075474-2	53840	01
380	23075475-5	KEYTOPS G	23075475-5	53840	01
390	23075476-3	KEYTOPS H	23075476-3	53840	01
400	23075478-4	KEYTOPS J	23075478-4	53840	01
410	23075479-7	KEYTOPS K	23075479-7	53840	01
420	23075480-9	KEYTOPS L	23075480-9	53840	01
430	23075511-1	KEYTOPS NEW LINE	23075511-1	53840	01
440	23075497-4	KEYTOPS :	23075497-4	53840	01
450	23075501-7	KEYTOPS =	23075501-7	53840	01
460	23075516-6	KEYTOPS SPARE KEY	23075516-6	53840	01
470	23075515-3	KEYTOPS A	23075515-3	53840	01
480	23075510-3	KEYTOPS 1	23075510-3	53840	01
490	23075494-5	KEYTOPS Z	23075494-5	53840	01
500	23075492-4	KEYTOPS X	23075492-4	53840	01
510	23075471-3	KEYTOPS C	23075471-3	53840	01
520	23075490-3	KEYTOPS V	23075490-3	53840	01
530	23075470-0	KEYTOPS B	23075470-0	53840	01
540	23075482-0	KEYTOPS N	23075482-0	53840	01
550	23075481-7	KEYTOPS M	23075481-7	53840	01
560	23075496-6	KEYTOPS ,	23075496-6	53840	01
570	23075495-3	KEYTOPS .	23075495-3	53840	01
580	23075512-4	KEYTOPS LINE FEED	23075512-4	53840	01
590	23075498-7	KEYTOPS ?	23075498-7	53840	01
600	23075499-5	KEYTOPS +	23075499-5	53840	01
610	23075508-3	KEYTOPS BLANK TAPE	23075508-3	53840	01
620	23075457-3	KEYTOPS SPACE BAR	23075457-3	53840	01
630	13291494-4	PLUNGER RING	3220020	54515	02



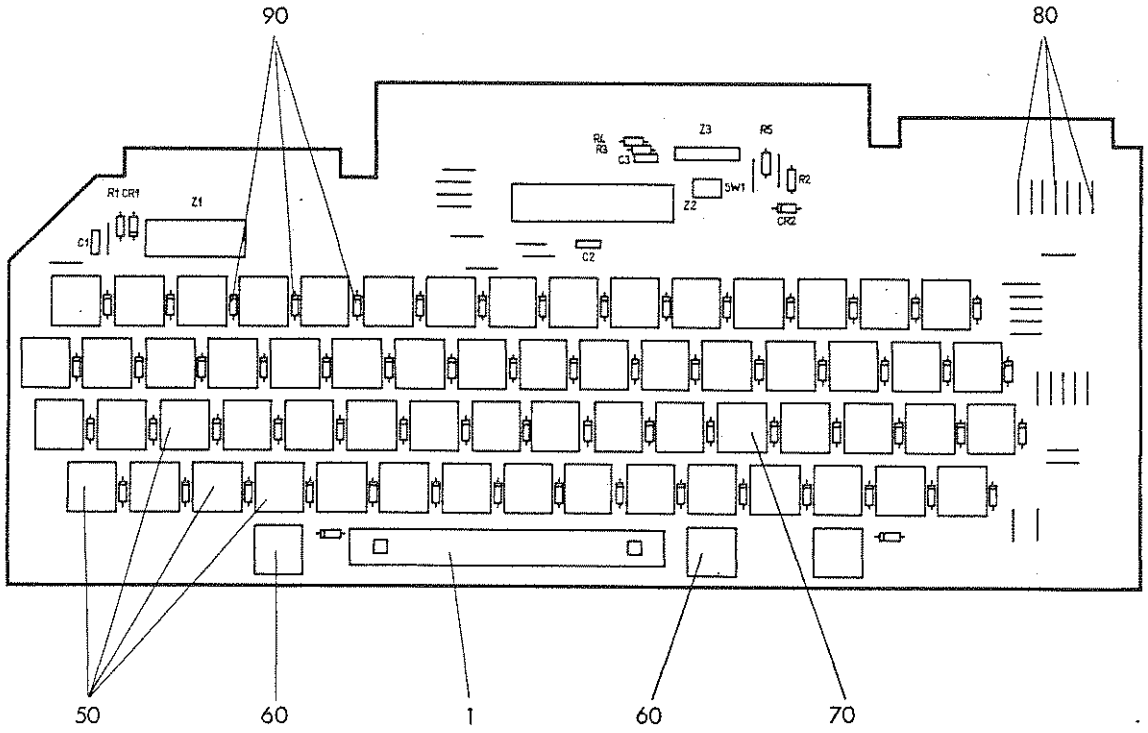
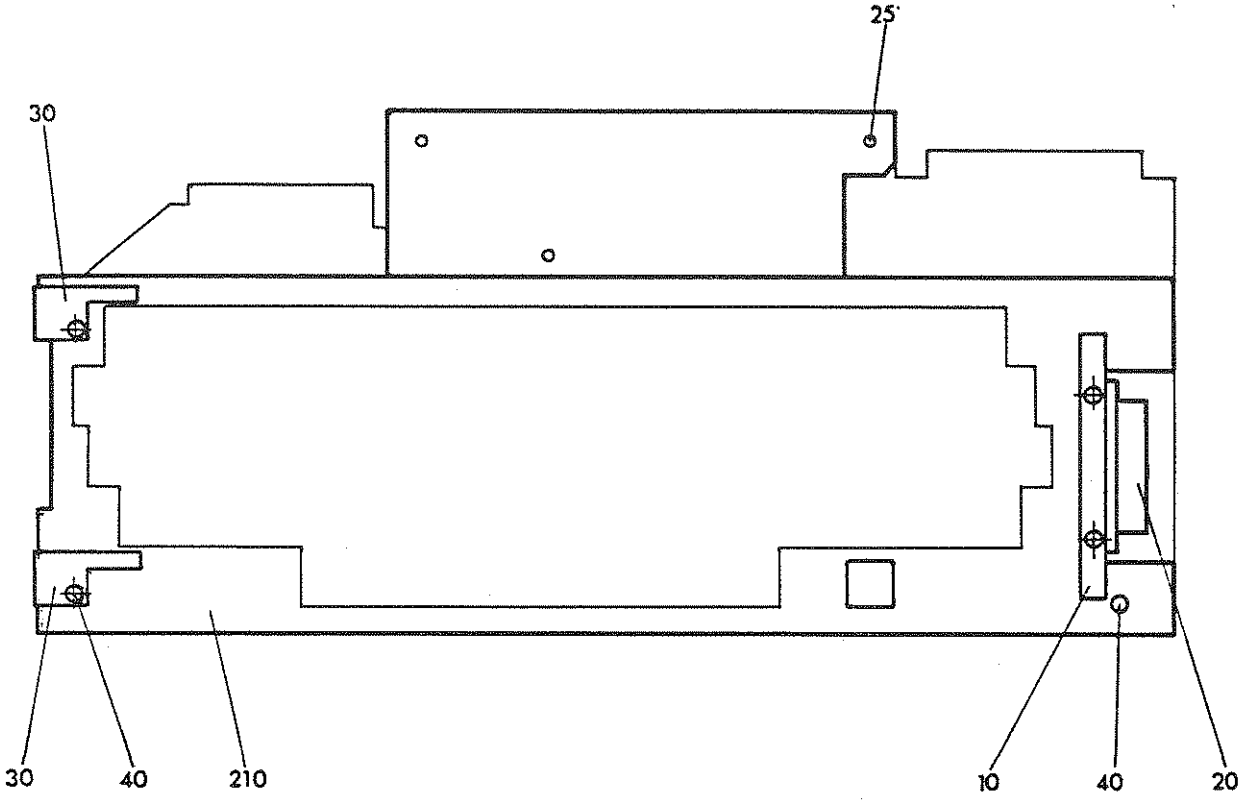


PLATE 3A CARD KEYBOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	13291493-1	SPACE BAR EQUALISER MECHANISM	SP23067532	54515	01
10	23075223-0	SPRING CLIP	23075223-0	53840	01
20	23079762-2	SPRING CLIP AND BRACKET	23079762-2	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
25	12441308-9	SPACER	ENMET6-18	52746	02
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
	15700295-4	WASHER Z3U	E27611E30AAUL	50035	02
30	23075224-3	SPRING CLIP	23075224-3	53840	02
40	23059108-8	SUPPORT PIECE	23059108-8	53840	04
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	10
	15700295-4	WASHER Z3U	E27611E30AAUL	50035	06
50	13211776-4	MAGNETIC SWITCH	SF6102	54515	61
60	13211777-7	MAGNETIC SWITCH	SF6101	54515	02
70	13211861-2	MAGNETIC SWITCH	SF6001	54515	01
80	13942135-6	LINK	E219P5LP2	53573	34
90	14019002-2	DIODE	1N4148	52745	64
-100	14018659-4	DIODE CR01	BZX55C5V6	52745	01
-110	14018656-0	DIODE CR02	BZX55C3V3	52745	01
-120	14458203-1	CAPACITOR 22NF -20+80% 16V C01	GFB606-22KJL	51350	01
-130	14458203-1	CAPACITOR 22NF -20+80% 16V C02	GFB606-22KJL	51350	01
-140	14458095-4	CAPACITOR 150PF +-2% 100V C03	222263858151	51956	01
-150	14339095-0	RESISTOR 1800 OHMS +-5% 1/4W R01	RC2T1K8J	52745	01
-160	14339095-0	RESISTOR 1800 OHMS +-5% 1/4W R02	RC2T1K8J	52745	01
-170	14338072-2	RESISTOR 1 MOHM +-5% 1/4W R03	RC2T1MJ	52745	01
-180	14339118-4	RESISTOR 100 KOHMS +-5% 1/4W R04	RC2T100KJ	52745	01
-190	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W R05	RC2T10KJ	52745	01
-192	13211888-6	SWITCH SW1	090620105	52116	01
-195	23075923-9	INTEGRATED CIRCUIT KEYBOARD ENCODER Z02	23075923-9	53840	01
-200	14049852-2	INTEGRATED CIRCUIT Z03	MC14049BCP	56687	01
210	**********	MAIN PLATE	**********		01



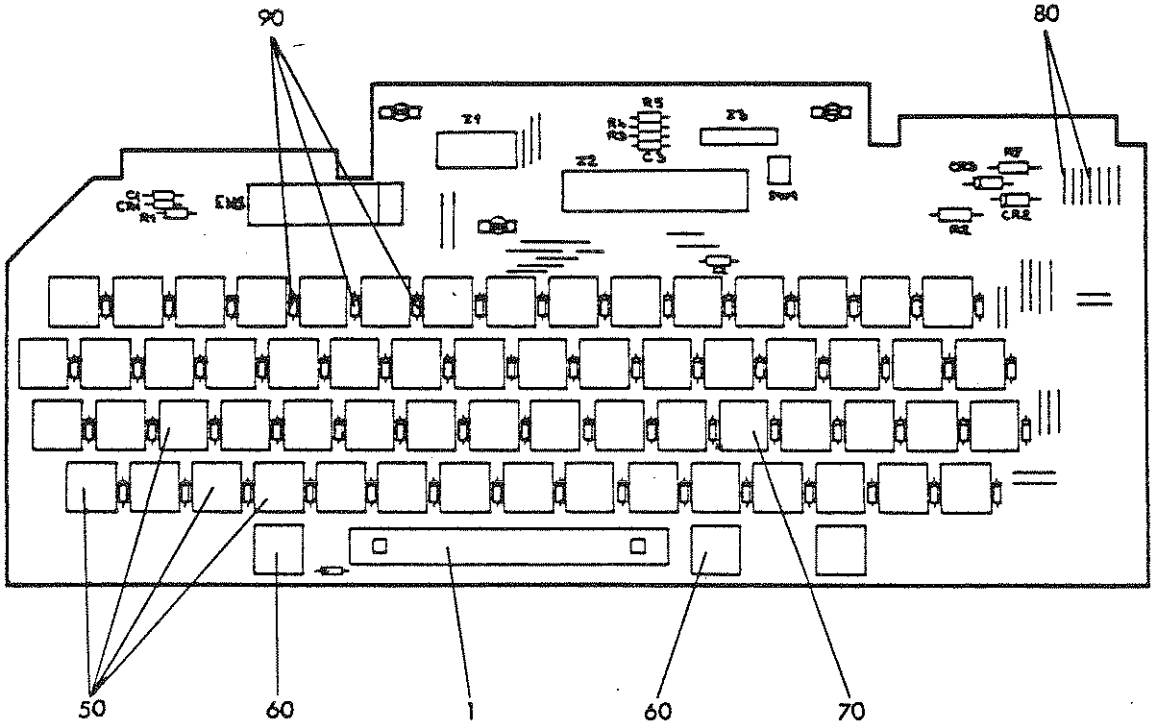
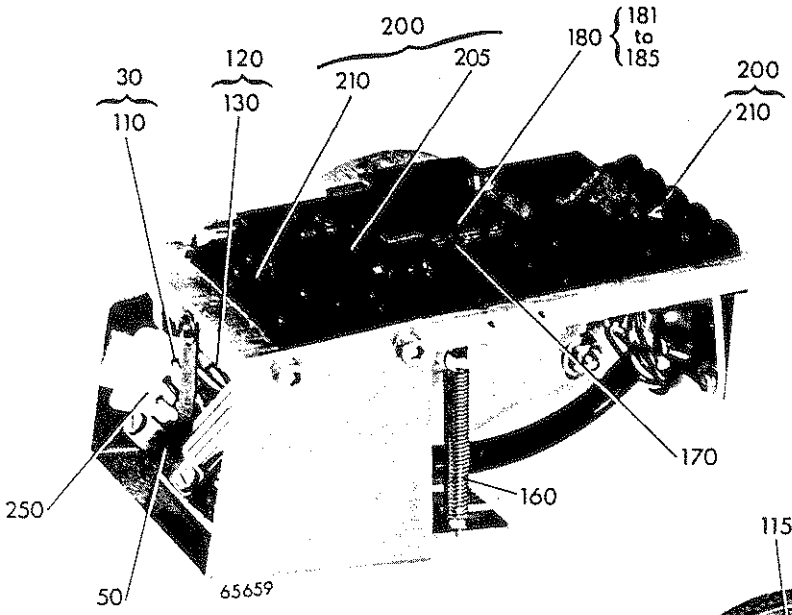
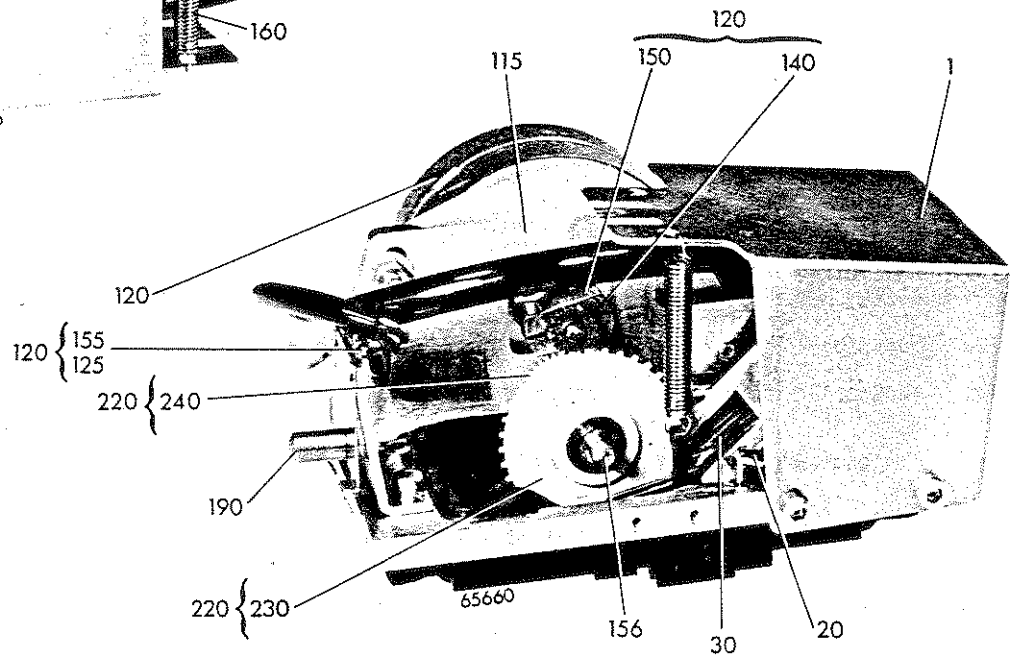


PLATE 38 CARD KEYBOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	13291729-7	SPACE BAR EQUALISER MECHANISM	10460900	54515	01
10	23075223-0	SPRING CLIP	23075223-0	53840	01
20	23109695-4	SPRING CLIP	23109695-4	53840	01
25	13942870-6	SUPPORT	LCBS-6N	59191	03
30	23075224-3	SPRING CLIP	23075224-3	53840	02
40	23107988-3	SPACER	23107988-3	53840	04
	15600344-4	SCREW CHC M3X6	E27161-30Q6CAUPA	50035	04
	15700250-8	WASHER Z3U	E27611M30CAUPA	50035	04
	15500019-7	NUT H M3U	E27411A30QQFUL	50035	04
50	13213236-5	MAGNETIC SWITCH	SFL6102	54515	61
60	13213235-2	MAGNETIC SWITCH	SFL6101	54515	02
70	13213234-4	MAGNETIC SWITCH	SFL6001	54515	01
90	14019002-2	DIODE	1N4148	52745	63
-100	14018659-4	DIODE CR01	BZX55C5V6	52745	01
-110	14018656-0	DIODE CR02	BZX55C3V3	52745	01
-111	14019002-2	DIODE CR03	1N4148	52745	01
-120	14458203-1	CAPACITOR 22NF -20+80% 16V C01-C02	GFB606-22KJL	51350	02
-140	14458095-4	CAPACITOR 150PF +-2% 100V C03	222263858151	51956	01
-150	14339095-0	RESISTOR 1800 OHMS +-5% 1/4W R01-R02	RC2T1K8J	52745	02
-170	14338072-2	RESISTOR 1 MOHM +-5% 1/4W R03	RC2T1MJ	52745	01
-180	14339118-4	RESISTOR 100 KOHMS +-5% 1/4W R04	RC2T100KJ	52745	01
-190	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W R05	RC2T10KJ	52745	01
-191	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R07	RC2T2K2J	52745	01
-192	13211888-6	SWITCH SW1	090620105	52116	01
-195	23075923-9	INTEGRATED CIRCUIT KEYBOARD ENCODER Z02	23075923-9	53840	01
-200	14049852-2	INTEGRATED CIRCUIT Z03	MC14049BCP	56687	01
210	**********	MAIN PLATE	**********		01





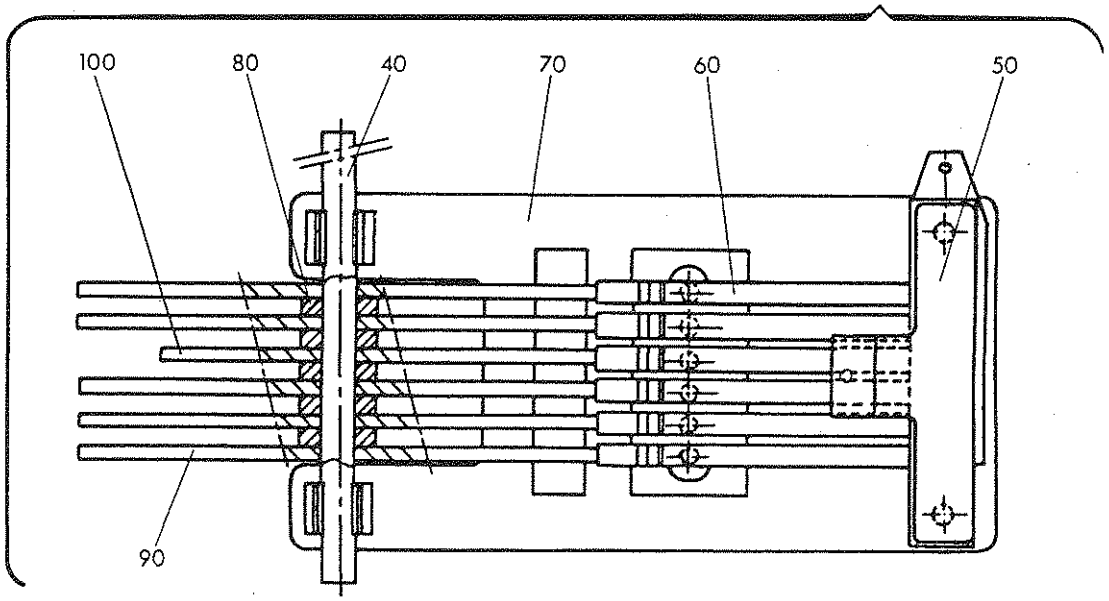
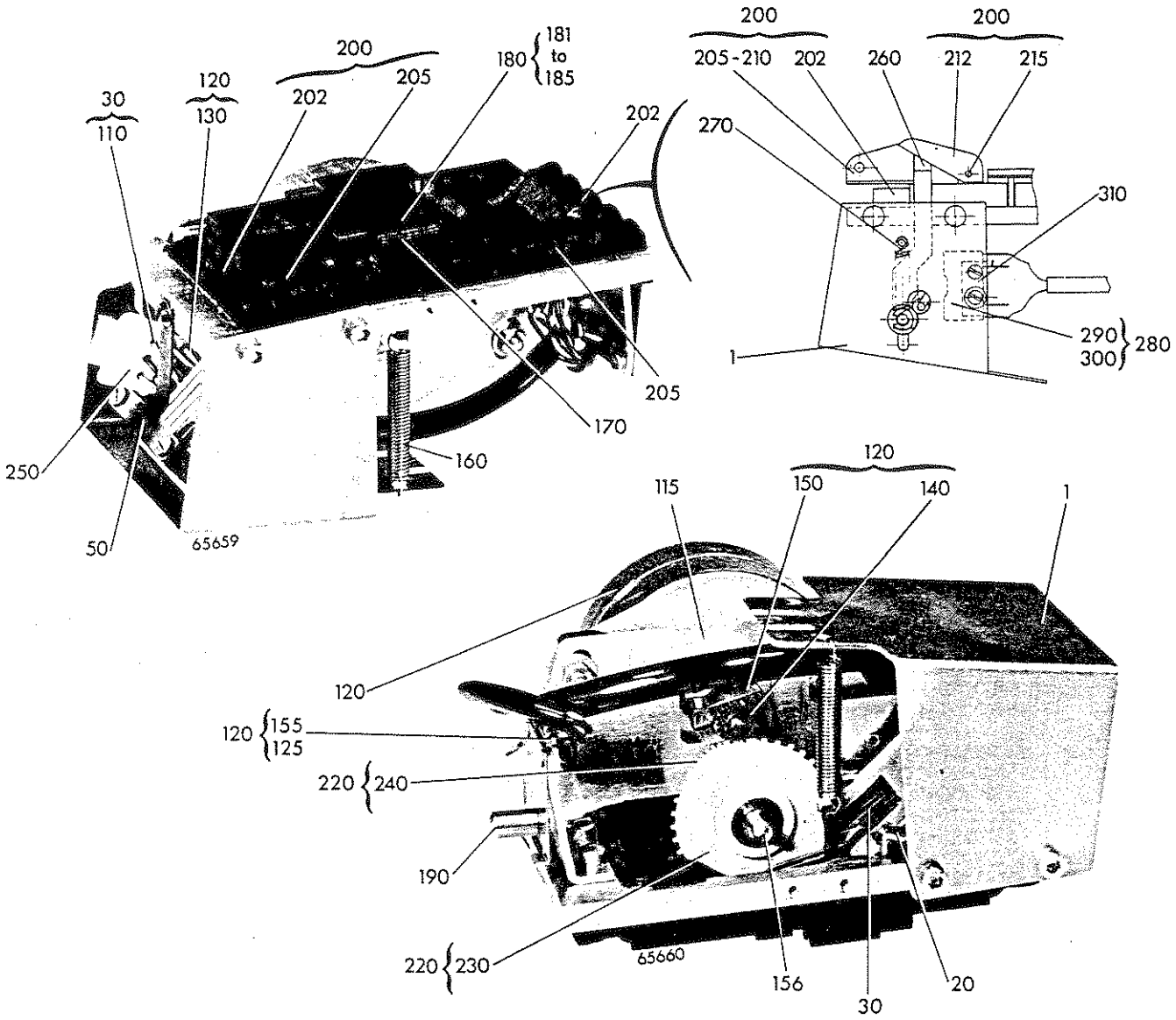


PLATE 4A TAPE READER

1	2	3 1 2 3 4 5 6 7	4		5
1	23073613-2	COVER	23073613-2	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	03
20	23073614-5	AXLE RETAINING BRACKET	23073614-5	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
30	23073612-4	FEELER BLOCK ASSEMBLY	23073612-4	53840	01
	15621020-5	SCREW C M2X6	E27115C20Q6QEUL	50035	01
	15700287-6	WASHER M2U	E27611M20AAUL	50035	01
40	23073610-3	. FEELER AXLE	23073610-3	53840	01
50	23073611-1	. ADJUSTING BRACKET	23073611-1	53840	01
	15621024-7	. SCREW C M2X16	E27115C20M16QEUL	50035	02
	15500014-7	. NUT H M2	E27411A20QQFUL	50035	02
60	23058495-5	. TERMINAL BLOCK (MOLDED TOGETHER)	23058495-5	53840	01
70	23058491-3	. CONTACT PLATE	23058491-3	53840	01
80	23057646-1	. FELT WASHER (DOES NOT EXIST FROM MACHINE SERIAL NO 16000)	23057646-1	53840	05
90	23057643-7	. ELEMENT FEELER	23057643-7	53840	05
100	23057644-0	. TAPE OUT FEELER	23057644-0	53840	01
110	13241328-6	. MALE CONTACT	02-06-2132	59191	07
115	23073552-3	MOTOR PLATE	23073552-3	53840	01
	15600052-1	SCREW CHC M3X10	E27161-30Q10QVUL	50035	02
	15700257-4	WASHER M3U	E27611M30AAUL	50035	02
120	23075564-0	MOTOR CABLE	23075564-0	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
	15600052-1	SCREW CHC M3X10	E27161-30Q10QVUL	50035	01
	15500019-7	NUT H M3	E27411A30QQFUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	03
125	15621021-8	SCREW C M2X8	E27115C20Q8QEUL	50035	01
130	13241328-6	. MALE CONTACT	02-06-2132	59191	05
140	23057710-3	. PINION 18 TEETH	23057710-3	53840	01
150	23058034-5	. CLAMP	23058034-5	53840	01
	15600050-0	. SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
155	23074744-0	. CONNECTOR BOX	23074744-0	53840	01
156	23075566-1	SHAFT	23075566-1	53840	01
160	23073740-2	SPRING	23073740-2	53840	01
170	23073843-3	TAPE LID LOCK	23073843-3	53840	01
180	23073844-6	TAPE LID ASSEMBLY	23073844-6	53840	01
	15621020-5	SCREW C M2X6	E27115C20Q6QEUL	50035	02
	15700287-6	WASHER M2U	E27611M20AAUL	50035	02
181	**********	. SHAFT	**********		01
182	**********	. SPRING	**********		01
183	**********	. TAP LID	**********		01
184	**********	. TAP LID SUPPORT	**********		01
185	**********	. PLATE (DOES NOT EXIST FROM MACHINE SERIAL NO 8199)	**********		01
190	23079570-1	LOCKING PIN	23079570-1	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
200	23074947-8	TAPE GUIDE ASSEMBLY	23074947-8	53840	01
205	**********	. SUPPORT	**********		01
210	23075350-0	. SHOCK ABSORBER	23075350-0	53840	02
220	23073404-2	SPROCKET WHEEL ASSEMBLY	23073404-2	53840	01
230	23073405-5	. SPROCKET WHEEL 36 TEETH	23073405-5	53840	01
240	23073407-6	. GEAR WHEEL 54 TEETH	23073407-6	53840	01
250	13233837-6	CONNECTOR (15 PIN)	03-06-2151	59191	01



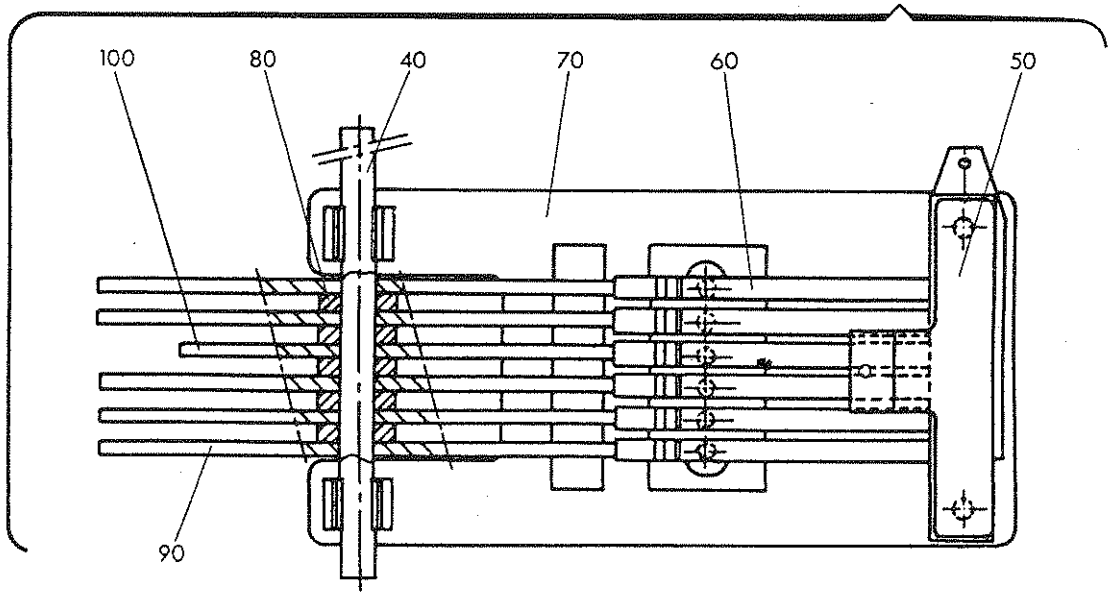
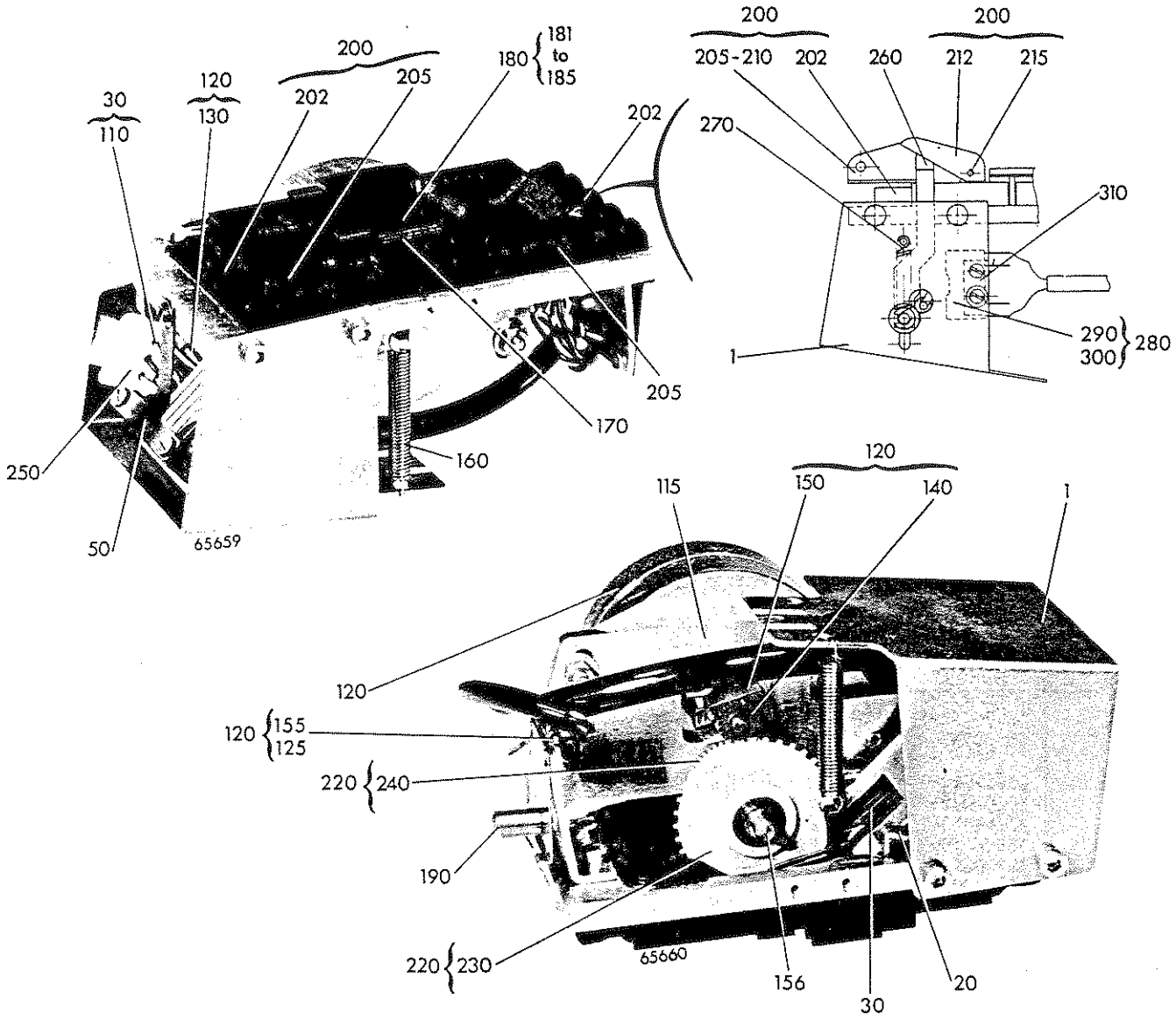


PLATE 4B TAPE READER (WITH PUNCHED TIGHT TAPE DETECTOR)

1	2	3 1 2 3 4 5 6 7	4		5
1	23075857-6	COVER	23075857-6	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	03
20	23073614-5	AXLE RETAINING BRACKET	23073614-5	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
30	23073612-4	FEELER BLOCK ASSEMBLY	23073612-4	53840	01
	15621020-5	SCREW C M2X6	E27115C20Q6QEUL	50035	01
	15700287-6	WASHER M2U	E27611M20AAUL	50035	01
40	23073610-3	. FEELER AXLE	23073610-3	53840	01
50	23073611-1	. ADJUSTING BRACKET	23073611-1	53840	01
	15621024-7	. SCREW C M2X16	E27115C20M16QEUL	50035	02
	15500014-7	. NUT H M2	E27411A20QQFUL	50035	02
60	23058495-5	. TERMINAL BLOCK (MOLDED TOGETHER)	23058495-5	53840	01
70	23058491-3	. CONTACT PLATE	23058491-3	53840	01
80	23057646-1	. FELT WASHER (DOES NOT EXIST FROM MACHINE SERIAL NO 16000)	23057646-1	53840	05
90	23057643-7	. ELEMENT FEELER	23057643-7	53840	05
100	23057644-0	. TAPE OUT FEELER	23057644-0	53840	01
110	13241328-6	. MALE CONTACT	02-06-2132	59191	07
115	23073552-3	MOTOR PLATE	23073552-3	53840	01
	15600052-1	SCREW CHC M3X10	E27161-30Q10QVUL	50035	02
	15700257-4	WASHER M3U	E27611M30AAUL	50035	02
120	23075564-0	MOTOR CABLE	23075564-0	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
	15600052-1	SCREW CHC M3X10	E27161-30Q10QVUL	50035	01
	15500019-7	NUT H M3	E27411A30QQFUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	03
125	15621021-8	SCREW C M2X8	E27115C20Q8QEUL	50035	01
130	13241328-6	. MALE CONTACT	02-06-2132	59191	05
140	23057710-3	. PINION 18 TEETH	23057710-3	53840	01
150	23058034-5	. CLAMP	23058034-5	53840	01
	15600050-0	. SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
155	23074744-0	. CONNECTOR BOX	23074744-0	53840	01
156	23075566-1	SHAFT	23075566-1	53840	01
160	23073740-2	SPRING	23073740-2	53840	01
170	23073843-3	TAPE LID LOCK	23073843-3	53840	01
180	23073844-6	TAPE LID ASSEMBLY	23073844-6	53840	01
	15621020-5	SCREW C M2X6	E27115C20Q6QEUL	50035	02
	15700287-6	WASHER M2U	E27611M20AAUL	50035	02
181	**********	. SHAFT	**********		01
182	**********	. SPRING	**********		01
183	**********	. TAP LID	**********		01
184	**********	. TAP LID SUPPORT	**********		01
185	**********	. PLATE (DOES NOT EXIST FROM MACHINE SERIAL NO 8199)	**********		01
190	23079570-1	LOCKING PIN	23079570-1	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
200	23075855-5	TAPE GUIDE ASSEMBLY	23075855-5	53840	01
202	23075350-0	. SHOCK ABSORBER	23075350-0	53840	02
205	23076263-7	. TAPE GUIDE	23076263-7	53840	01
210	15621020-5	. SCREW C M2X6	E27115C20Q6QEUL	50035	02
212	23075863-8	. CRADLE	23075863-8	53840	01
215	23075864-1	. SHAFT	23075864-1	53840	01
220	23073404-2	SPROCKET WHEEL ASSEMBLY	23073404-2	53840	01
230	23073405-5	. SPROCKET WHEEL 36 TEETH	23073405-5	53840	01
240	23073407-6	. GEAR WHEEL 54 TEETH	23073407-6	53840	01
250	13233837-6	CONNECTOR (15 PIN)	03-06-2151	59191	01



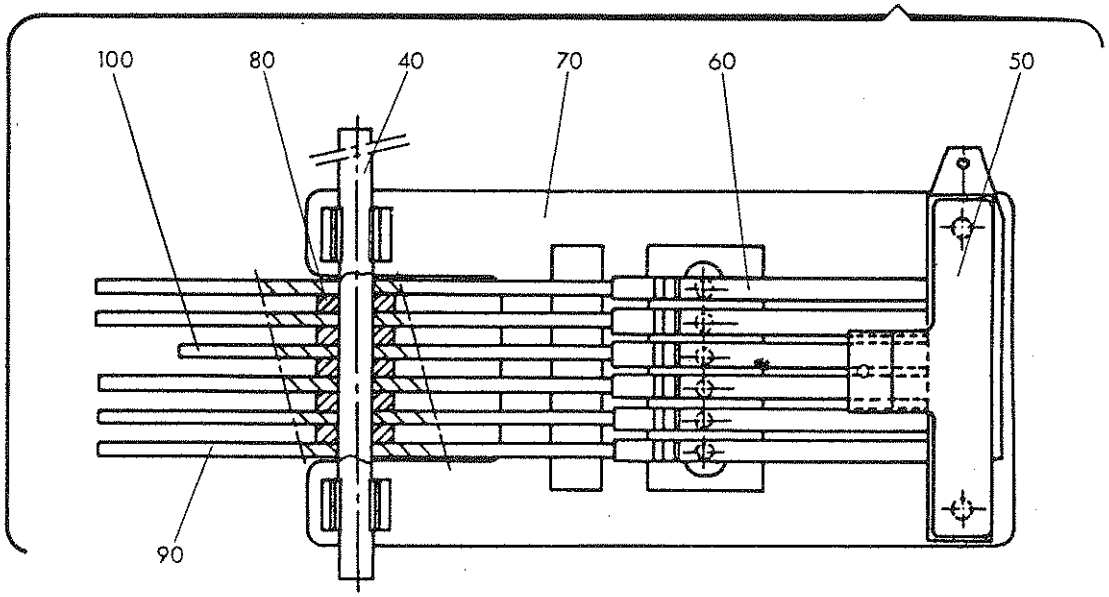


PLATE 4B TAPE READER (WITH PUNCHED TIGHT TAPE DETECTOR)

1	2	3 1 2 3 4 5 6 7	4		5
260	23075860-9	LEVER ASSEMBLY	23075860-9	53840	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
	12210102-4	CIRCLIP (TRUARC GRIP RING) DIAM 2.3MM	23203AM0023T	50297	01
270	23075865-9	SPRING	23075865-9	53840	01
280	23075868-3	CABLE ASSEMBLY	23075868-3	53840	01
290	13211502-0	. SWITCH	83133002	50614	01
300	13241328-6	. MALE CONTACT	02-06-2132	59191	02
310	23073797-3	PLATE	23073797-3	53840	01
	15621022-6	SCREW C M2X10	E27115C20Q10QEUL	50035	02
	15700287-6	WASHER M2U	E27611M20AAUL	50035	01

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sērial	Comments
23074900-1	12	To add a capacitor of 330 pF between the points 2 and 3 of the LM311 circuit and strapping of points 5 and 6 to point 8	5	23075240-9		34000	
	23	To add a red mark on the tape punch lid	-			37969	
	56	Addition of a ground braid	-			3907	
	57	Plastic casing of the back locking device	5			60000	

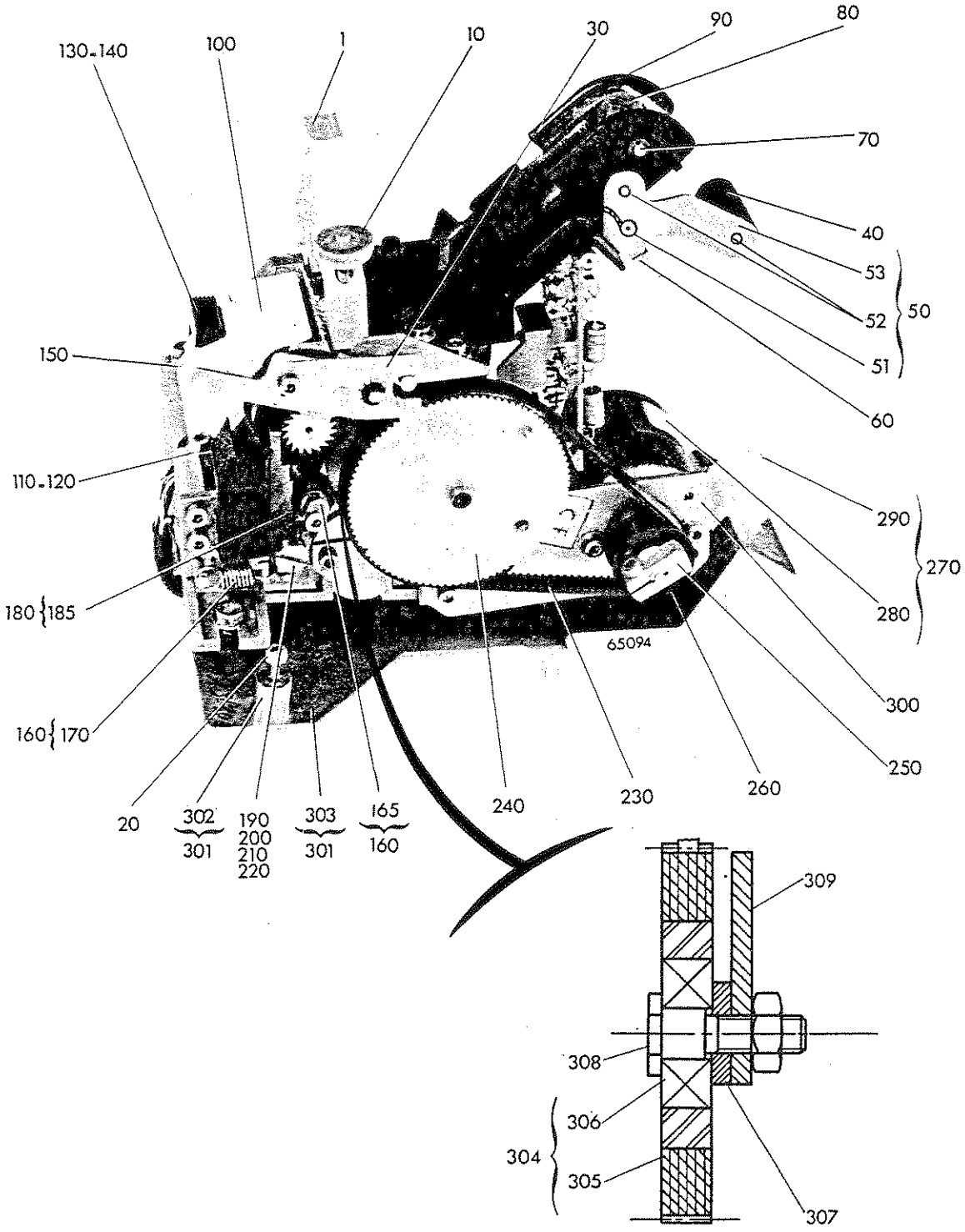


PLATE 5 TAPE PUNCH

1	2	3 1 2 3 4 5 6 7	4		5
1	23075756-1	CHAD GUIDE	23075756-1	53840	01
10	23059553-6	KNURLED NUT	23059553-6	53840	01
20	23059941-9	CAPTIVE SCREW	23059941-9	53840	02
30	23059282-4	PUNCH BACK SPACER LEVER	23059282-4	53840	01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
	15700257-4	WASHER M3U	E27611M30AAUL	50035	02
40	23075101-9	ROLLER	23075101-9	53840	01
	12210102-4	CIRCLIP DIAM 2.3MM	23203AM0023T	50297	01
50	23075096-3	LEVER ASSEMBLY	23075096-3	53840	01
51	**********	. BRAID,WIRE	**********		01
52	**********	. SHAFT	**********		02
53	**********	. LEVER	**********		01
60	23075102-7	SPRING	23075102-7	53840	01
	12210102-4	CIRCLIP DIAM 2.3MM	23203AM0023T	50297	01
70	23076380-3	ROLLER SHAFT	23076380-3	53840	01
80	23076379-1	ROLLER	23076379-1	53840	01
90	23075086-9	TAPE GUIDE	23075086-9	53840	01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
	15700257-4	WASHER M3U	E27611M30AAUL	50035	02
100	23073789-5	TAPE PRESSER	23073789-5	53840	01
110	23057469-9	SHAFT	23057469-9	53840	01
120	23074790-3	CLAMP	23074790-3	53840	02
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
130	23073790-7	LATCH	23073790-7	53840	01
140	23075103-0	SHAFT SCREW	23075103-0	53840	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
	15500019-7	NUT H M3	E27411A30QQFUL	50035	01
150	23057470-6	SPRING	23057470-6	53840	01
160	23057485-5	ECCENTRIC STOP,ASSEMBLY	23057485-5	53840	01
	15600274-9	SCREW CHC M3X20	E27161-30M20QVUL	50035	01
165	**********	. ECCENTRIC	**********		01
170	23075339-4	SPRING	23075339-4	53840	01
180	23075324-5	TAPE FEED ARMATURE ASSEMBLY	23075324-5	53840	01
185	**********	. HUB	**********		01
190	23075299-1	PIVOT SCREW	23075299-1	53840	01
200	23075326-6	SLEEVE BEARING INNER	23075326-6	53840	01
210	12910042-1	NEEDLE BEARING DIAM 1 LENGTH 6.8	NR1X6-8	51201	18
220	23075428-9	WASHER	23075428-9	53840	01
230	12140784-4	BELT MINI-PITCH STEP	80123X1-4	50711	01
240	23074962-6	90 TOOTH PULLEY,ASSEMBLY	23074962-6	53840	01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
250	23058034-5	CLAMP	23058034-5	53840	01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
260	23079016-0	30 TOOTH PULLEY,ASSEMBLY	23079016-0	53840	01
270	23075285-5	MOTOR ASSEMBLY	23075285-5	53840	01
	15600046-9	SCREW CHC M3X5	E27161-30Q5QVUL	50035	02
280	14448436-3	. POLYESTER CAPACITOR 0.1MF +-10% 250V	222235245104	51956	01
290	13241327-3	. FEMALE CONTACT	02-06-1132	59191	02
300	23074736-7	MOTOR SUPPORT	23074736-7	53840	01
	15600052-1	SCREW CHC M3X10	E27161-30Q10QVUL	50035	02
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
301	23074050-3	SUPPORT ASSEMBLY	23074050-3	53840	01
302	**********	. HUB	**********		02
303	**********	. SUPPORT	**********		01

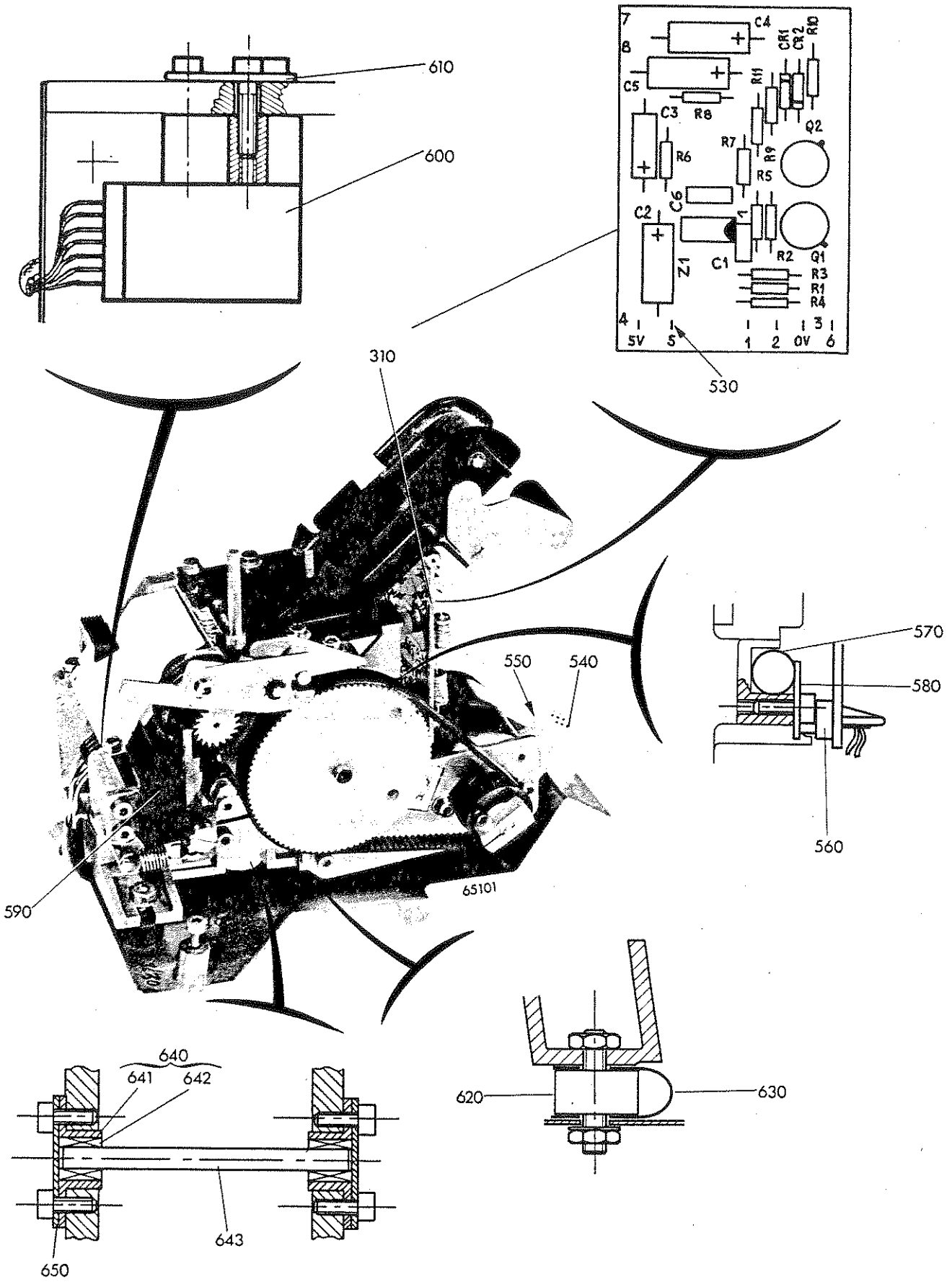


PLATE 5 TAPE PUNCH

1	2	3 1 2 3 4 5 6 7	4		5
304	23076458-2	GEAR ASSEMBLY	23076458-2	53840	01
305	**********	• GEAR	**********		01
306	**********	• BEARING	**********		01
307	23057478-0	SPACER	23057478-0	53840	01
308	23057479-3	PIVOT SCREW	23057479-3	53840	01
309	23074787-0	PLATE	23074787-0	53840	01
310	23075241-2	SYNCHRONIZING BOARD	23075241-2	53840	01
320	14019002-2	• DIODE	1N4148	52745	01
		CR01			
330	14019002-2	• DIODE	1N4148	52745	01
		CR02			
340	14458203-1	• CAPACITOR 22NF -20+80% 16V	GFB606-22KJL	51350	01
		C01			
350	14428449-5	• CAPACITOR 4.7MF -10+50% 63V	222201590003	51956	01
		C02			
360	14428449-5	• CAPACITOR 4.7MF -10+50% 63V	222201590003	51956	01
		C03			
370	14428449-5	• CAPACITOR 4.7MF -10+50% 63V	222201590003	51956	01
		C04			
380	14428449-5	• CAPACITOR 4.7MF -10+50% 63V	222201590003	51956	01
		C05			
381	14458130-2	• CAPACITOR 330PF +-10% 63V	222263003331	51956	01
		C06			
390	14038854-9	• TRANSISTOR	2N2222A	52745	01
		Q01			
400	14038854-9	• TRANSISTOR	2N2222A	52745	01
		Q02			
	14099000-5	• TRANSISTOR STANDOFF	EN340	50537	02
410	14339098-9	• RESISTOR 2.2 KOHMS +-5% 0.25W	RC2T2K2J	52745	01
		R01			
420	14339112-1	• RESISTOR 15 KOHMS +-5% 0.25W	RC2T15KJ	52745	01
		R02			
430	14339112-1	• RESISTOR 15 KOHMS +-5% 0.25W	RC2T15KJ	52745	01
		R03			
440	14339094-7	• RESISTOR 1 KOHM +-5% 0.25W	RC2T1KJ	52745	01
		R04			
450	14339113-9	• RESISTOR 22 KOHMS +-5% 0.25W	RC2T22KJ	52745	01
		R05			
460	14339094-7	• RESISTOR 1 KOHM +-5% 0.25W	RC2T1KJ	52745	01
		R06			
470	14339094-7	• RESISTOR 1 KOHM +-5% 0.25W	RC2T1KJ	52745	01
		R07			
480	14339104-3	• RESISTOR 220 OHMS +-5% 0.25W	RC2T220UJ	52745	01
		R08			
490	14339104-3	• RESISTOR 220 OHMS +-5% 0.25W	RC2T220UJ	52745	01
		R09			
500	14338202-8	• RESISTOR 12 OHMS +-5% 0.25W	RC2T12UJ	52745	01
		R10			
510	14339094-7	• RESISTOR 1 KOHM +-5% 0.25W	RC2T1KJ	52745	01
		R11			
520	14058069-3	• INTEGRATED CIRCUIT	SN72311P	52367	01
		Z01			
530	13941640-9	• LUG	E215-5	53573	08
540	13241327-3	FEMALE CONTACT	02-06-1132	59191	13
550	13233835-5	CONNECTOR (15 PIN)	03-06-1151	59191	01
560	12441577-3	LOCKING BOARD SUPPORT	LCBS3N	59191	02
570	23076896-0	COIL	23076896-0	53840	01
580	23074738-8	CLAMP	23074738-8	53840	01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
590	23075531-4	ELECTRO-MAGNET ASSEMBLY (TAPE FEED)	23075531-4	53840	01
	15600143-7	SCREW CHC M3X12	E27161-30Q12QVUL	50035	02
	15700257-4	WASHER M3U	E27611M30AAUL	50035	02
600	23057463-6	ELECTRO-MAGNETS ASSEMBLY BLOCK (PUNCH)	23057463-6	53840	01
610	23075427-1	PLATE	23075427-1	53840	01
	15600143-7	SCREW CHC M3X12	E27161-30Q12QVUL	50035	03
620	12410252-9	INSULATOR	LXA66A1S0	50095	03

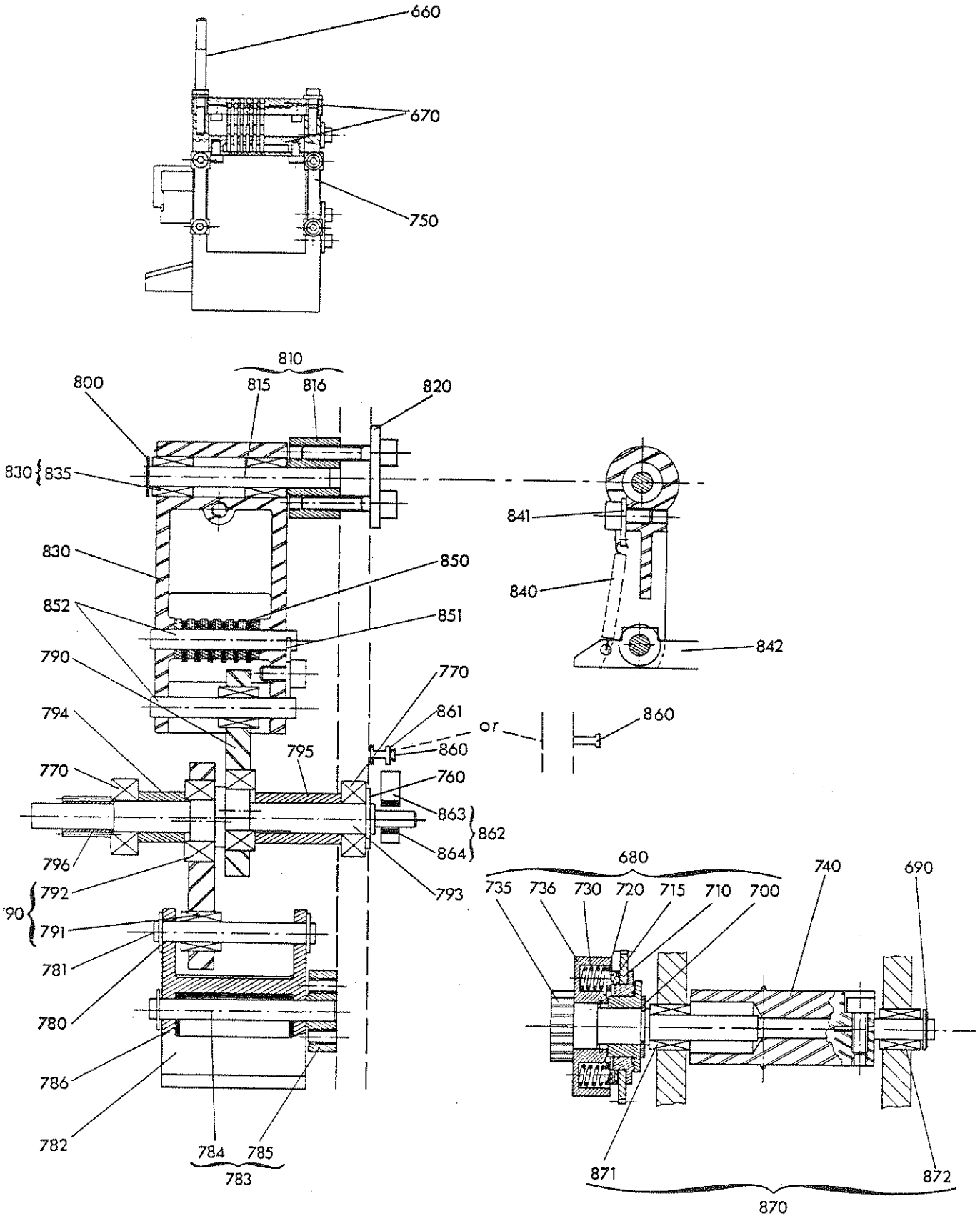


PLATE 5 TAPE PUNCH

1	2	3 1 2 3 4 5 6 7	4		5
630	23059586-2	EARTHING BAND	23059586-2	53840	01
	15700259-5	WASHER Z4U	E27611E40AAUL	50035	01
	15700289-7	WASHER M4U	E27611M40AAUL	50035	03
	15500022-0	NUT H M4	E27411A40QQFUL	50035	06
640	23057445-4	AXLE BEARING ASSEMBLY	23057445-4	53840	02
641	**********	. AXLE BEARING	**********		01
642	**********	. NEEDLE RACE 4X8X8 HOLD	**********		01
643	23057444-6	SHAFT	23057444-6	53840	01
650	23057416-0	PLATE	23057416-0	53840	02
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	04
660	23075894-3	BOLT	23075894-3	53840	01
670	23074784-1	PUNCH BLOC ASSEMBLY	23074784-1	53840	01
	15600058-4	SCREW CHC M3X16	E27161-30M16QVUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	02
680	23075429-2	RATCHET ASSEMBLY	23075429-2	53840	01
	15700259-5	WASHER Z4U	E27611E40AAUL	50035	01
690	12210095-7	CIRCLIP (TRUARC GRIP RING) DIAM 4MM	7555-0040A060T	52499	01
700	12210104-5	. CIRCLIP (TRUARC GRIP RING) DIAM 6MM	23203AM0060T	50297	01
710	23075433-3	. GEAR ASSEMBLY	23075433-3	53840	01
715	23076482-6	. FELT WASHER	23076482-6	53840	01
720	23075432-0	. DISC	23075432-0	53840	01
730	23057455-8	. COMPRESSION SPRING	23057455-8	53840	04
735	**********	. RATCHET	**********		01
736	**********	. HOUSING	**********		01
740	23074973-8	SPROCKET WHEEL	23074973-8	53840	01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
750	23074737-5	CLAMP	23074737-5	53840	02
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
	15600143-7	SCREW CHC M3X12	E27161-30Q12QVUL	50035	02
	15700257-4	WASHER M3U	E27611M30AAUL	50035	02
760	12210225-8	CIRCLIP (TRUARC RING) DIAM 6MM	7555-0060A080T	52499	01
770	12518047-8	BEARING 6X15X5	AY6ZZ	50112	02
780	12210232-3	CIRCLIP (TRUARC GRIP RING) DIAM 3.2MM	23203AM0032T	50297	02
781	23075317-0	SHAFT	23075317-0	53840	01
782	23075318-3	LEVER	23075318-3	53840	01
783	23059638-0	SHAFT ASSEMBLY	23059638-0	53840	01
784	**********	. SHAFT	**********		01
785	**********	. BASE	**********		01
786	23058830-4	FELT	23058830-4	53840	01
790	23057432-6	CONNECTING BAIL ASSEMBLY	23057432-6	53840	02
791	**********	. NEEDLE RACE 4X8X8	**********		01
792	**********	. BEARING 8X16X6	**********		01
793	23075854-2	ECCENTRIC	23075854-2	53840	01
794	23057433-9	SPACER	23057433-9	53840	01
795	23057434-7	SPACER	23057434-7	53840	01
796	23057435-0	GEAR	23057435-0	53840	01
800	12210095-7	CIRCLIP (TRUARC RING) DIAM 4MM	7555-0040A060T	52499	02
810	23057443-3	SHAFT ASSEMBLY	23057443-3	53840	01
815	**********	. SHAFT	**********		01
816	**********	. BASE	**********		01
820	23074611-2	CLAMP	23074611-2	53840	02
	15600143-7	SCREW CHC M3X12	E27161-30Q12QVUL	50035	04
830	23074791-6	PUNCH LEVER BAIL ASSEMBLY	23074791-6	53840	01
835	**********	. NEEDLE RACE	**********		02
840	23057442-5	SPRING	23057442-5	53840	06
841	23057441-2	SPRING FASTENER	23057441-2	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
842	23059071-3	PUNCH SETTING LEVER	23059071-3	53840	06
850	23057440-4	FELT	23057440-4	53840	07
851	23059633-5	PLATE	23059633-5	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
852	23057444-6	SHAFT	23057444-6	53840	02

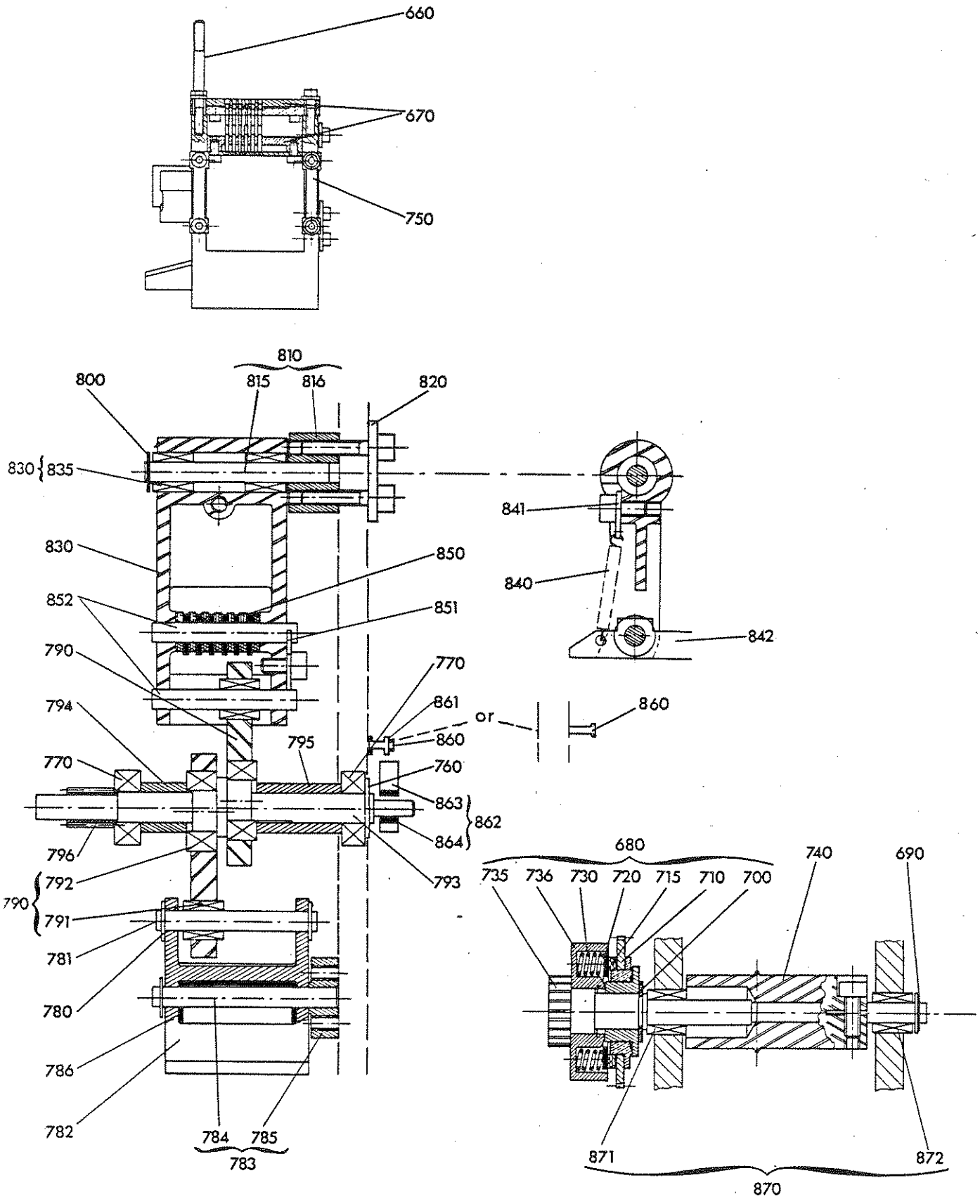
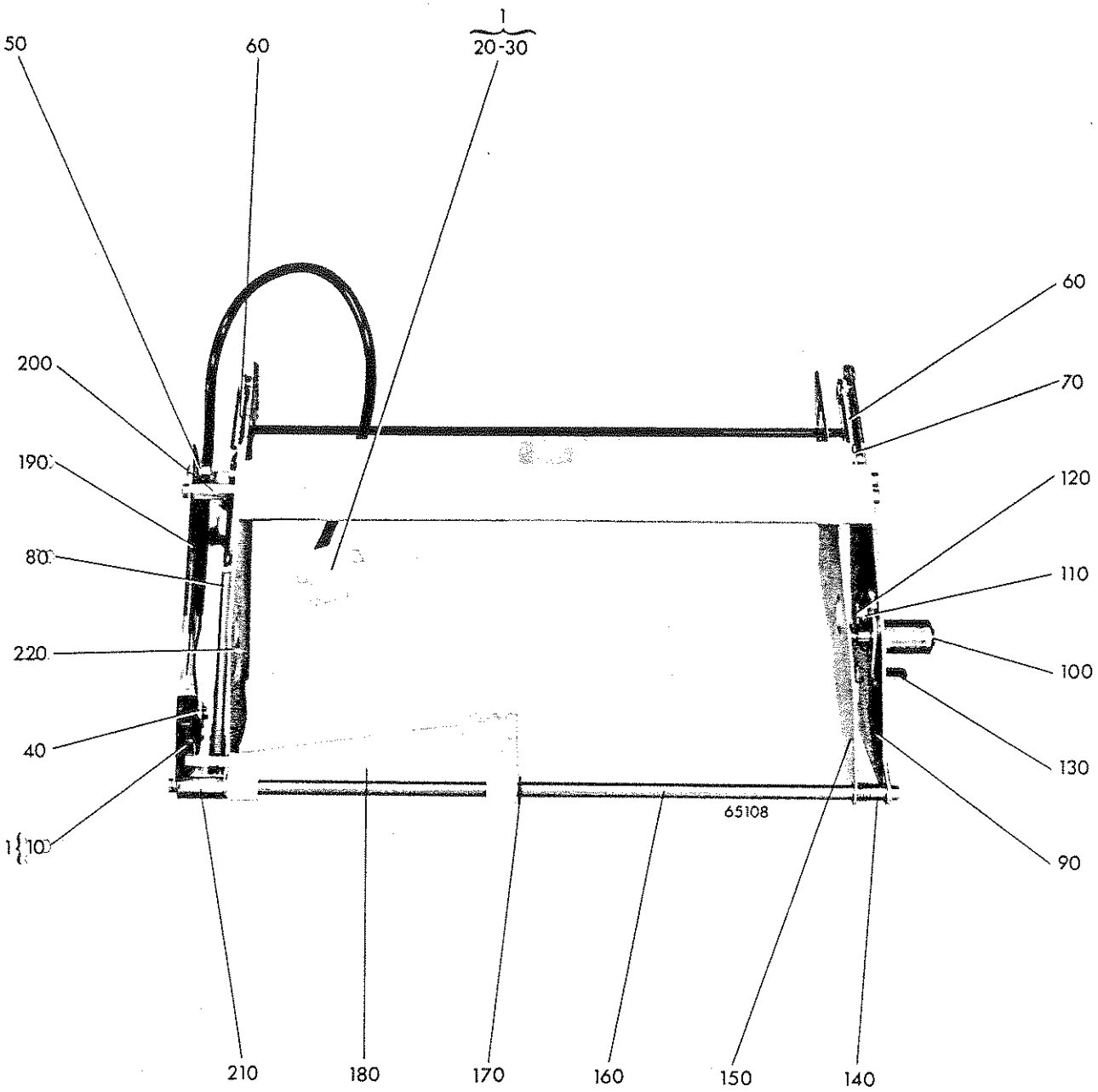


PLATE 5 TAPE PUNCH

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23074800-9	19	New paper low sensing lever	6				
	21	Double thickness of paper low switch support	6				

1	2	3 1 2 3 4 5 6 7	4		5
860	23074788-3	PIVOT SCREW	23074788-3	53840	01
861	23074789-1	COLLAR	23074789-1	53840	01
862	23074785-9	ANTI BACKLASH CLUTCH ASSEMBLY	23074785-9	53840	01
863	**********	. COLLAR	**********		01
864	**********	. MINI CLUTCH RC02 TORRINGTON	**********		01
870	23074783-8	FRAME ASSEMBLY	23074783-8	53840	01
871	**********	. NEEDLE RACE 5X9X8 OR 5X9X9 HOLD	**********		01
872	**********	. NEEDLE RACE 4X8X8 HOLD	**********		01



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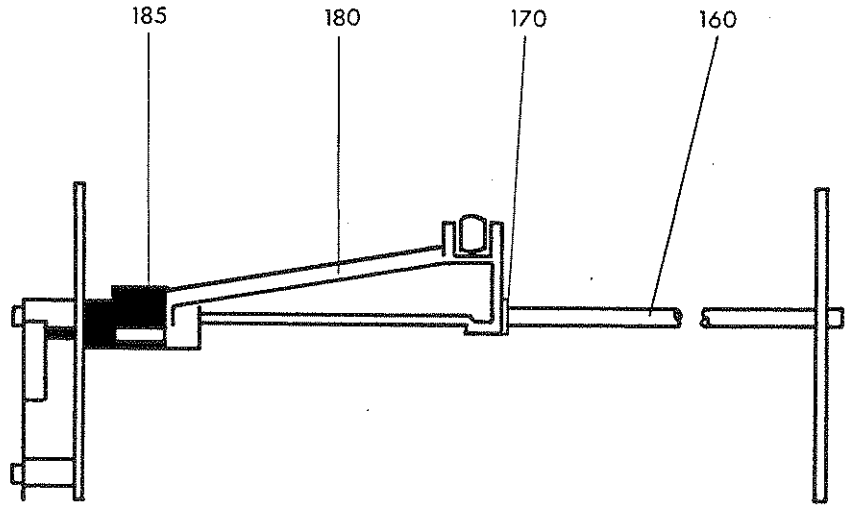


PLATE 6 PAPER ADVANCE

1	2	3 1 2 3 4 5 6 7	4		5
1	**********	PAPER LOW SWITCH AND CORD ASSEMBLY (SEE PLATE 00 ITEM 57)	**********		PM
10	13211502-0	. SWITCH	83133002	50614	01
20	13233526-3	. CONNECTOR (3 PIN)	03-06-1031	59191	01
30	13241327-3	. FEMALE CONTACT	02-06-1132	59191	02
40	**********	SCREW-TAPPED PLATE (SEE PLATE 00 ITEM 58)	**********		PM
	**********	SCREW C M2X10 (SEE PLATE 00 ITEM 58)	**********		PM
	**********	WASHER M2U	**********		PM
50	13941576-2	CLAMP	H1P	53127	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
	15700257-4	WASHER M3	E27611M30AAUL	50035	01
	15500019-7	NUT H M3U	E27411A30QQFUL	50035	01
60	23059028-9	SPRING	23059028-9	53840	02
70	23074769-3	SPRING FASTENER	23074769-3	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
80	23075532-2	SPRING	23075532-2	53840	01
90	**********	RIGHT END PLATE	**********		01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	03
	15700257-4	WASHER M3	E27611M30AAUL	50035	02
	15500019-7	NUT H M3U	E27411A30QQFUL	50035	02
100	12210233-1	CIRCLIP (TRUARC GRIP RING) DIAM 4MM	23203AM0040T	50297	01
110	23074770-5	SPRING	23074770-5	53840	01
120	**********	NUT LOCK	**********		01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
130	**********	LOCK	**********		01
140	23073925-8	SPRING	23073925-8	53840	02
150	**********	MOVABLE END PLATE	**********		01
160	**********	SHAFT	**********		01
170	12210233-1	CIRCLIP (TRUARC GRIP RING) DIAM 4MM	23203AM0040T	50297	01
180	23079410-5	PAPER LOW SENSING LEVER	23079410-5	53840	01
185	23115095-1	PUSH	23115095-1	53840	01
190	**********	PROTECTIVE PLATE	**********		01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
200	23074772-6	SPACER	23074772-6	53840	01
210	23075236-8	SPACER	23075236-8	53840	01
220	**********	LEFT END PLATE	**********		01

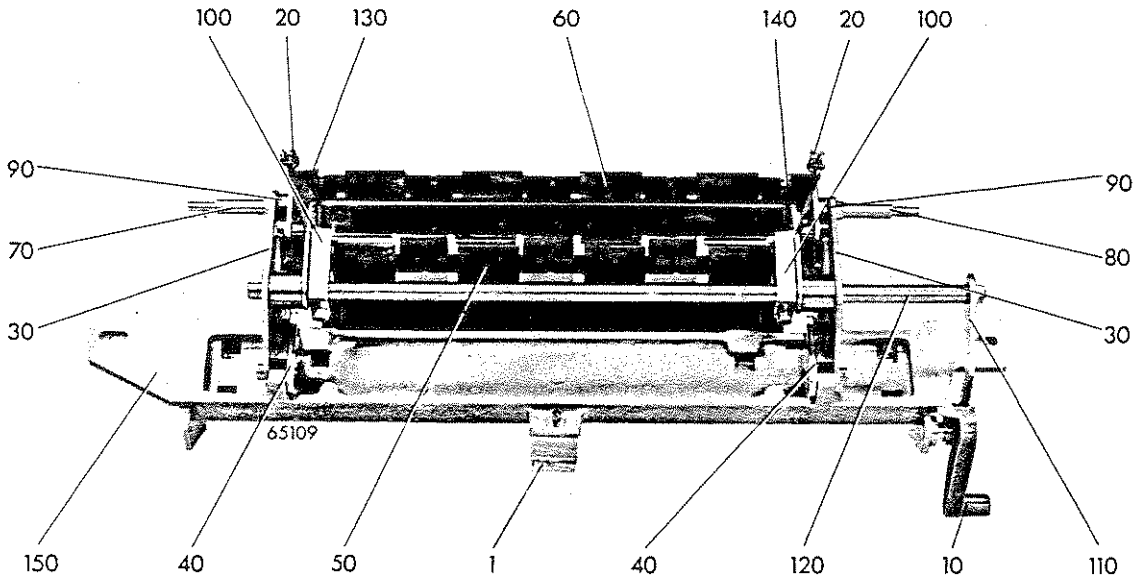
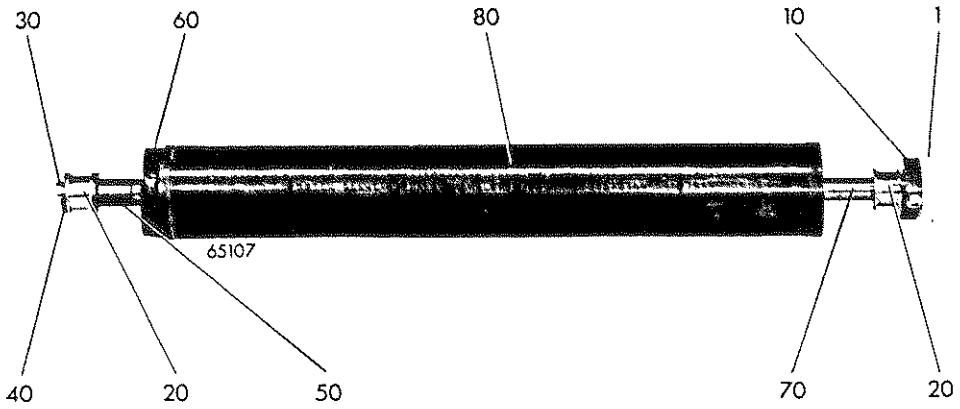


PLATE 7 PRESSURE ROLLERS

1	2	3 1 2 3 4 5 6 7	4		5
1	23074615-4	SPRING BLADE	23074615-4	53840	01
	15600058-4	SCREW CHC M3X16	E27161-30M16QVUL	50035	01
	15500019-7	NUT H M3	E27411A30QQFUL	50035	01
10	23079803-3	OPERATING LEVER	23079803-3	53840	01
20	23074336-4	SPRING	23074336-4	53840	02
30	**********	SIDE PLATE	**********		02
	15600052-1	SCREW CHC M3X10	E27161-30Q10QVUL	50035	04
40	23074774-7	PLATE THREADED	23074774-7	53840	02
50	23059006-5	PRESSURE ROLLER DIAM 12 HOLD	23059006-5	53840	01
60	23059008-6	PRESSURE ROLLER DIAM 9 HOLD	23059008-6	53840	01
70	23074330-1	PIN SCREW	23074330-1	53840	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
	15500019-7	NUT H M3	E27411A30QQFUL	50035	01
80	23074331-4	PIN SCREW	23074331-4	53840	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
	15500019-7	NUT H M3	E27411A30QQFUL	50035	01
90	23074332-2	SPACER	23074332-2	53840	02
100	**********	ARM	**********		02
	15600052-1	SCREW CHC M3X10	E27161-30Q10QVUL	50035	01
	15850117-5	EXPANDING PIN 2X10	E2X10EMCD	51530	01
110	23074139-9	LEVER	23074139-9	53840	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
	15500019-7	NUT H M3	E27411A30QQFUL	50035	01
120	23074337-7	SHAFT	23074337-7	53840	01
130	**********	LEFT ARM	**********		01
140	**********	RIGHT ARM	**********		01
150	**********	SUPPORT	**********		01

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sërial	Comments
23074750-2	25	New platen sub-assembly	8	-		41000	
	72	Replacement of the platen sub-assembly by a platen moulded around the shaft	8	-		71500	



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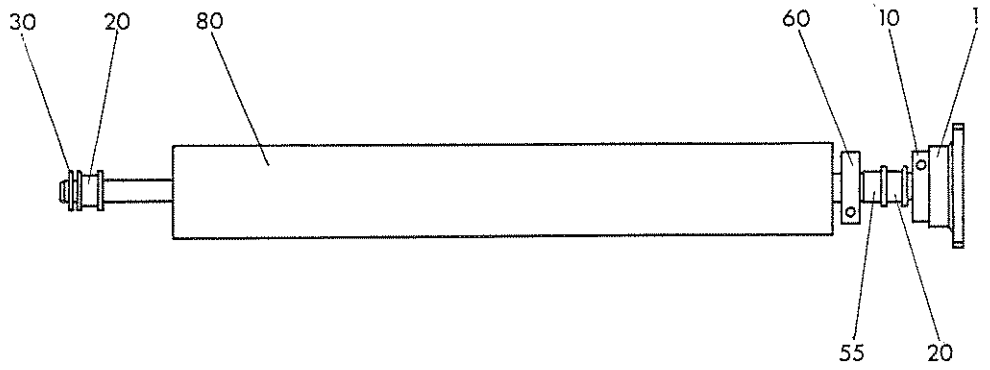

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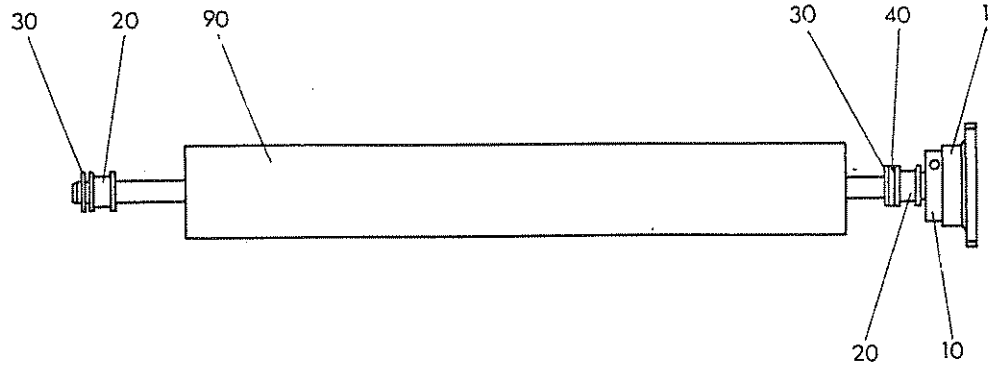


PLATE 8 PLATEN

1	2	3 1 2 3 4 5 6 7	4		5
1	23079017-8	45 TEETH MOULDED PULLEY	23079017-8	53840	01
10	23058841-1	CLAMP	23058841-1	53840	01
	15600058-4	SCREW CHC M3X16	E27161-30M16QVUL	50035	01
20	23058915-8	BEARING	23058915-8	53840	02
30	12210234-4	CIRCLIP (TRUARC GRIP RING) DIAM 7MM	23203AM0070T	50297	02
40	23058730-2	WASHER	23058730-2	53840	01
50	23075089-3	SPACER	23075089-3	53840	01
55	23108306-9	SPACER	23108306-9	53840	01
60	23058731-0	CLAMPING RING	23058731-0	53840	01
	15600058-4	SCREW CHC M3X16	E27161-30M16QVUL	50035	01
70	23074749-0	PLATEN SHAFT	23074749-0	53840	01
80	23058725-8	PLATEN (WITHOUT FITTINGS)	23058725-8	53840	01
90	23118049-6	PLATEN	23118049-6	53840	01

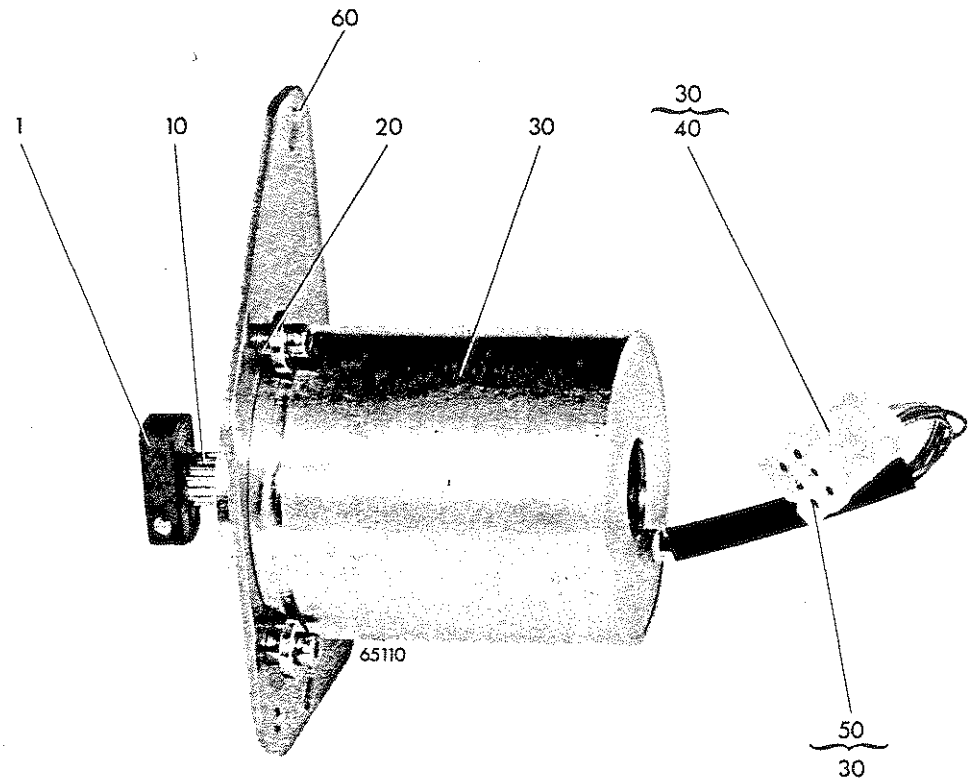


PLATE 9 LINE FEED MOTOR

1	2	3 1 2 3 4 5 6 7	4		5
1	23058757-6	CLAMP	23058757-6	53840	01
	15600058-4	SCREW CHC M3X16	E27161-30M16QVUL	50035	01
10	23079154-2	15 TEETH PULLEY	23079154-2	53840	01
20	23058755-5	CLAMP	23058755-5	53840	03
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	03
30	23059194-7	MOTOR	23059194-7	53840	01
40	13233828-0	• CONNECTOR (6 PIN)	03-06-1061	59191	01
50	13241320-2	• FEMALE CONTACT	02-06-1131	59191	06
60	**********	SUPPORT BRACKET	**********		01

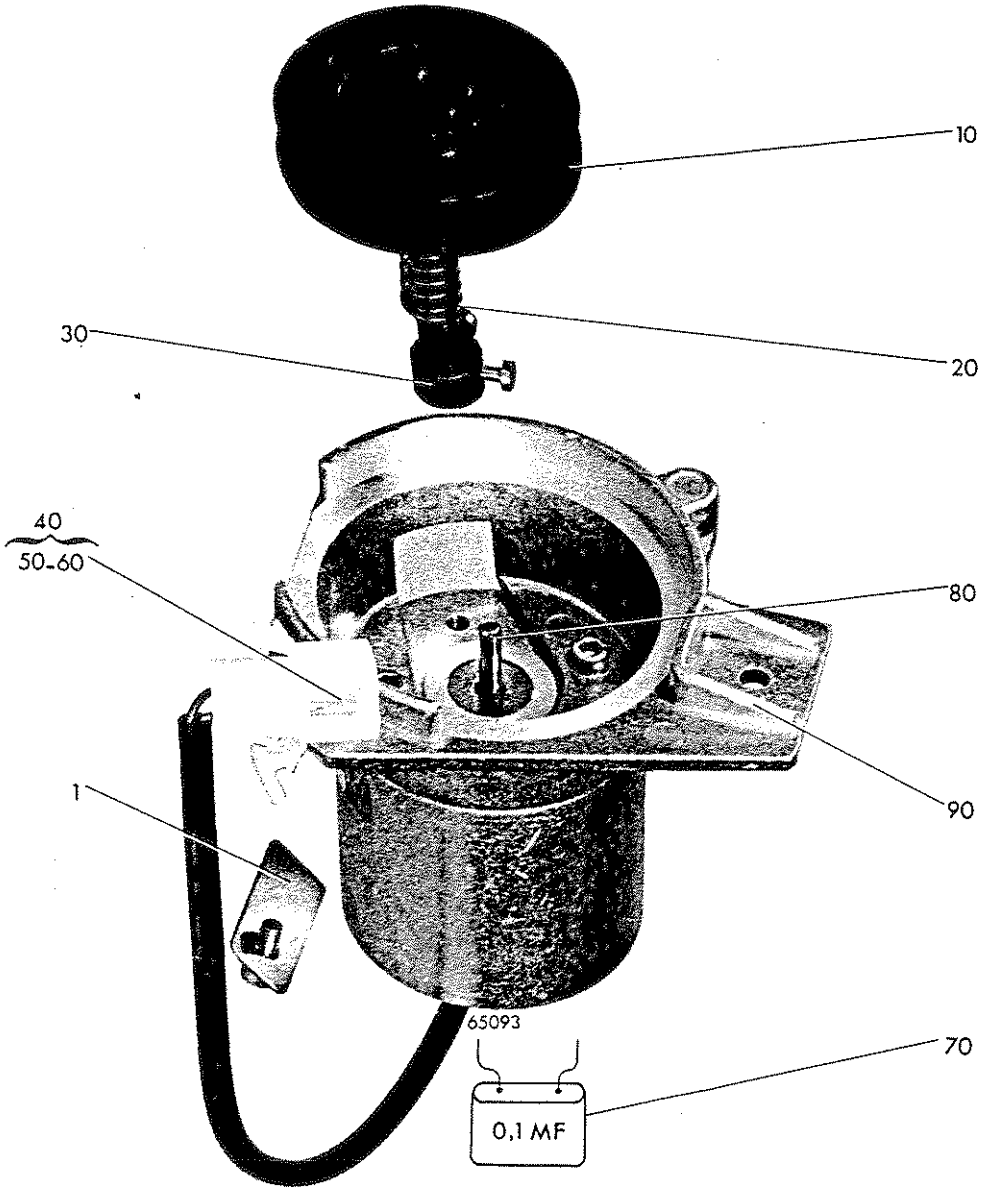


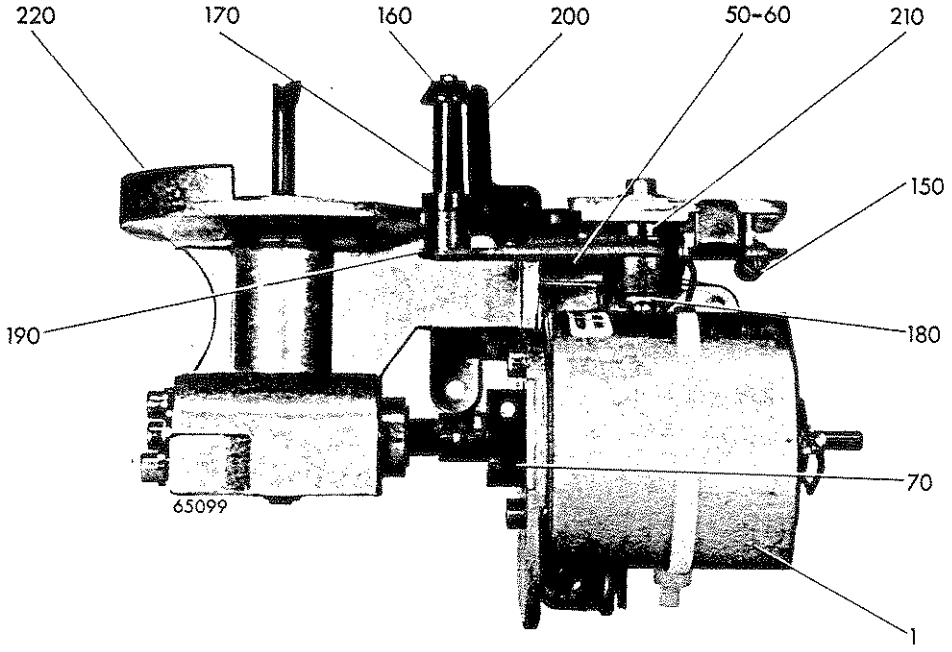
PLATE 10 RIBBON ASSEMBLY (LEFT)

1	2	3 1 2 3 4 5 6 7	4		5
1	23071971-9	STOP PLATE	23071971-9	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
10	23079023-0	SPOOL CARRIER	23079023-0	53840	01
20	23073747-3	SPRING	23073747-3	53840	01
30	23073741-0	SHAFT	23073741-0	53840	01
	15621020-5	SCREW C M2X6	E27115C20Q6QEUL	50035	01
40	23075328-7	WIRING HARNESS	23075328-7	53840	01
50	13233535-9	. CONNECTOR (2 PIN)	03-06-2022	59191	01
60	13241328-6	. MALE CONTACT	02-06-2132	59191	02
70	14448436-3	CAPACITOR 0.1MF +-10% 250V	222235245104	51956	01
80	13410340-8	MOTOR	4322-010-75130	51956	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
90	23071967-8	CASTING	23071967-8	53840	01

ASSEMBLY SUMMARY SHEET

RIBBON ASSEMBLY (RIGHT)

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23079153-9	6	To add a rubber part around the coupling	11				



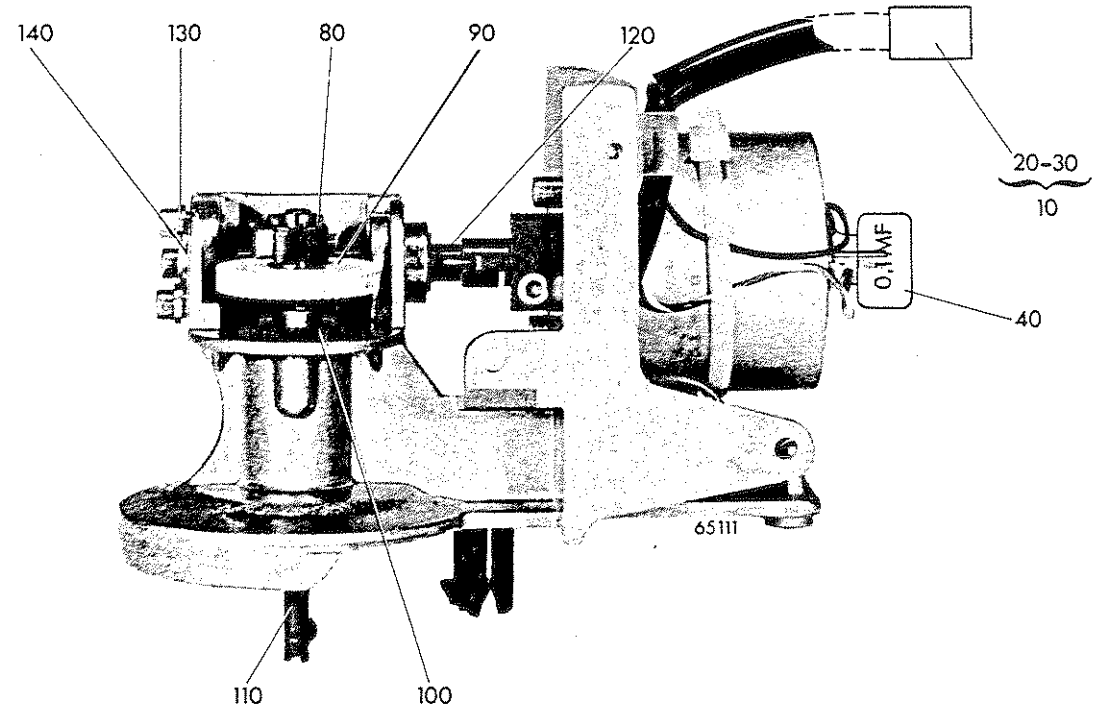


PLATE 11 RIBBON ASSEMBLY (RIGHT)

1	2	3 1 2 3 4 5 6 7	4		5
1	13410340-8	MOTOR	4322-010-75130	51956	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
10	23075327-4	WIRING HARNESS	23075327-4	53840	01
20	13233830-5	. CONNECTOR (6 PIN)	03-06-2062	59191	01
30	13241321-6	. MALE CONTACT	02-06-2131	59191	05
40	14448436-3	CAPACITOR 0.1MF +-10% 250V	222235245104	51956	01
50	13211502-0	RIBBON REVERSE SWITCH	83133002	50614	01
	15621563-0	SCREW CBL M2X16	22294AG020016L	50297	02
	15700288-9	WASHER M2.5U AC.33	E27611M25AAUL	50035	01
	15700287-6	WASHER M2U	E27611M20AAUL	50035	01
60	23073797-3	SCREW-TAPPED PLATE	23073797-3	53840	01
70	23058814-3	COUPLING	23058814-3	53840	01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
80	23057251-2	CLAMP	23057251-2	53840	01
	15600052-1	SCREW CHC M3X10	E27161-30Q10QVUL	50035	01
90	23071932-1	HELICAL GEAR	23071932-1	53840	01
100	23058817-7	PLATE	23058817-7	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
110	23075914-3	CONTROL SHAFT	23075914-3	53840	01
120	23071960-2	WORM SCREW	23071960-2	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
130	23079002-9	CLAMPING WASHER	23079002-9	53840	02
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
140	12520026-2	BEARING	WFBX6ZZ	50112	01
150	23058829-2	SPRING	23058829-2	53840	01
160	12210102-4	CIRCLIP (TRUARC GRIP RING) DIAM 2.3MM	23203AM0023T	50297	01
170	23079336-4	ROLLER	23079336-4	53840	01
180	12210233-1	CIRCLIP (TRUARC GRIP RING) DIAM 4MM	23203AM0040T	50297	01
	15700296-2	WASHER Z5U	E27611E50AAUL	50035	01
190	23059882-6	LEVER	23059882-6	53840	01
200	23079324-9	LEVER	23079324-9	53840	01
210	23058828-4	SHAFT	23058828-4	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
220	23079152-1	CASTING	23079152-1	53840	01

ASSEMBLY SUMMARY SHEET

PRINTING FRAME

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23075000-4	58	Reference 23058915-8 becomes 23116374-2 (new material)	12				

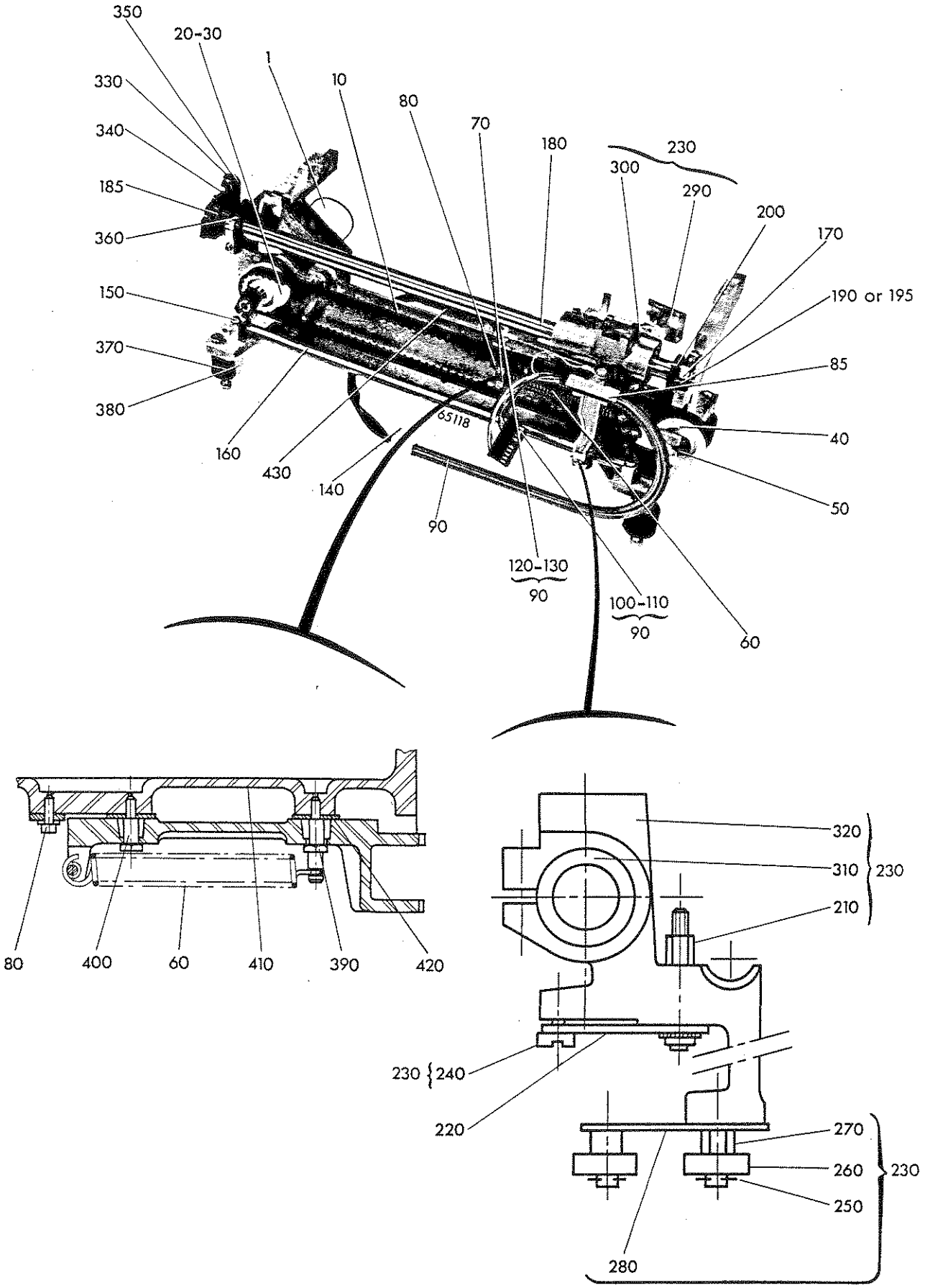


PLATE 12 PRINTING FRAME

1	2	3 1 2 3 4 5 6 7	4		5
1	**********	DRIVE MOTOR (SEE PL.00 ITEM 13)	**********		PM
10	12140751-3	BELT NOTCHED	XL037	07155	01
20	23079018-1	18 TEETH PULLEY	23079018-1	53840	01
30	23058841-1	CLAMP	23058841-1	53840	01
	15600143-7	SCREW CHC M3X12	E27161-30Q12QVUL	50035	01
40	23079015-7	18 TEETH PULLEY	23079015-7	53840	01
50	23058851-5	PULLEY SHAFT	23058851-5	53840	01
60	23058854-4	SPRING	23058854-4	53840	01
70	23058852-3	SPRING ANCHOR/SCREW	23058852-3	53840	01
80	23058853-6	STOP	23058853-6	53840	01
	15600052-1	SCREW CHC M3X10	E27161-30Q10QVUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
85	23058831-2	CLAMP	23058831-2	53840	01
	15500019-7	NUT H M3	E27411A30QQFUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
90	23075032-2	CARRIAGE CABLE ASSEMBLY	23075032-2	53840	01
100	13233945-1	• CONNECTOR (10 PIN)	280362	50075	01
110	13241403-5	• FEMALE CONTACT	280530-2	50075	09
120	13233673-1	• CONNECTOR (9 PIN)	03-06-2091	59191	01
130	13241328-6	• MALE CONTACT	02-06-2132	59191	09
140	23071931-8	CABLE CLIP	23071931-8	53840	01
	15600143-7	SCREW CHC M3X12	E27161-30Q12QVUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
150	23058843-2	CLAMP	23058843-2	53840	02
	15600274-9	SCREW CHC M3X20	E27161-30M20QVUL	50035	02
	15700257-4	WASHER M3U	E27611M30AAUL	50035	02
160	23058842-9	LOWER GUIDANCE SHAFT	23058842-9	53840	01
170	23058916-1	CLAMP	23058916-1	53840	02
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
180	23079319-5	UPPER GUIDANCE SHAFT	23079319-5	53840	01
185	23079318-7	KNOB	23079318-7	53840	01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
190	23058915-8	BEARING	23058915-8	53840	02
195	23116374-2	BEARING	23116374-2	53840	02
200	23074752-3	STOP	23074752-3	53840	02
210	23058892-4	SHAFT	23058892-4	53840	01
220	23058801-0	CLAMP	23058801-0	53840	01
230	23079252-3	CARRIAGE	23079252-3	53840	01
240	23058810-1	• SHOULDER SCREW	23058810-1	53840	01
250	12210232-3	• CIRCLIP (TRUARC GRIP RING) DIAM 2.3MM	23203AM0032T	50297	02
260	12510937-4	• BALL BEARING	604ZZ	50112	02
270	23058806-0	• SHAFT	23058806-0	53840	01
280	23058803-1	• RIVETED SUPPORT ASSEMBLY	23058803-1	53840	01
290	23074938-2	• RIBBON GUIDE	23074938-2	53840	01
	15600048-0	• SCREW CHC M3X6	E27161-30Q6QVUL	50035	01
300	23074939-0	• SPECIAL SCREW	23074939-0	53840	01
310	12110170-2	• BALL RACE	KH1228	51201	02
	15600058-4	• SCREW CHC M3X16	E27161-30M16QVUL	50035	01
320	23074267-7	• CARRIAGE CASTING	23074267-7	53840	01
330	23074588-9	BOLT	23074588-9	53840	01
340	23079337-7	ROLLER	23079337-7	53840	01
350	23079323-1	FORK	23079323-1	53840	01

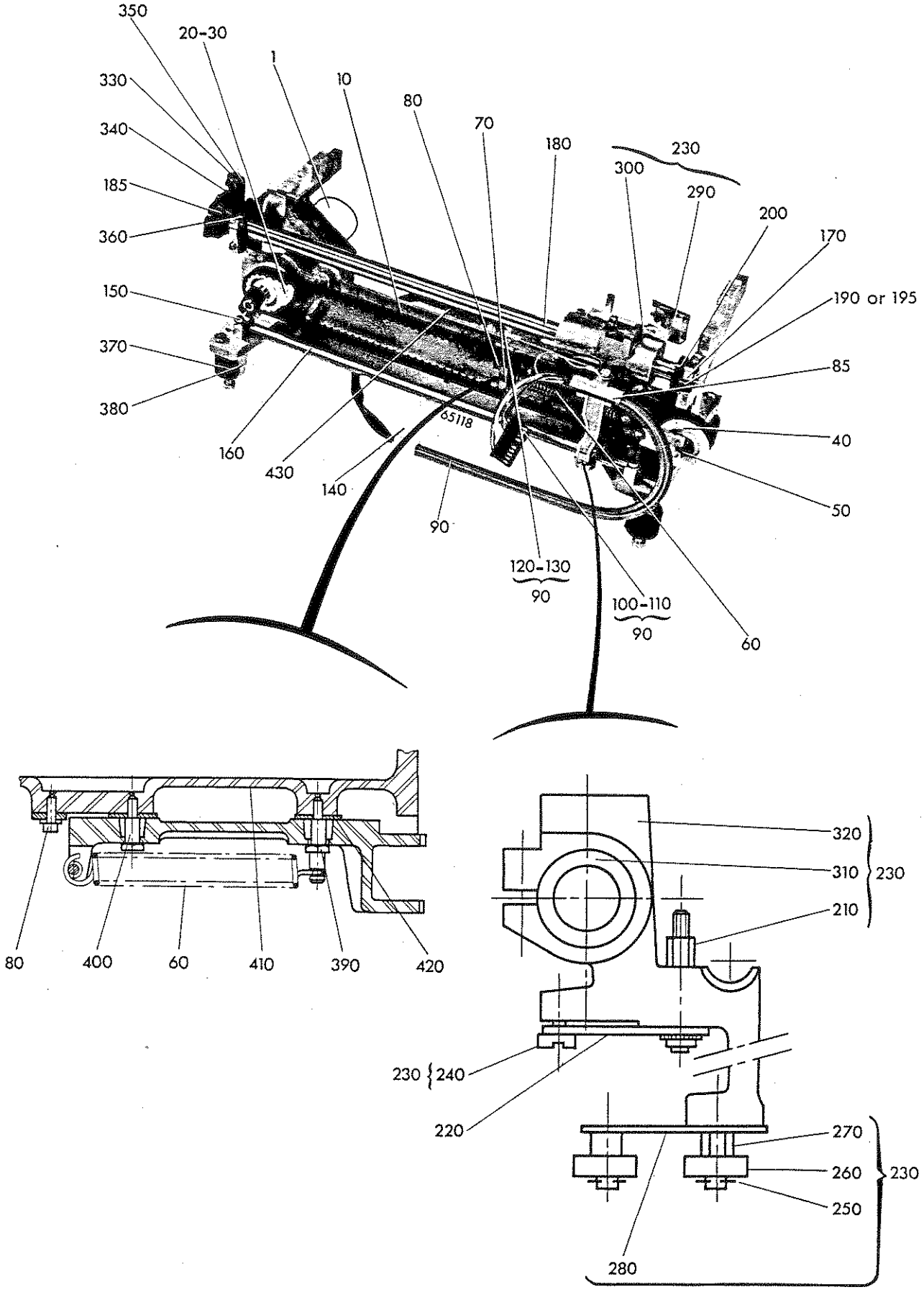
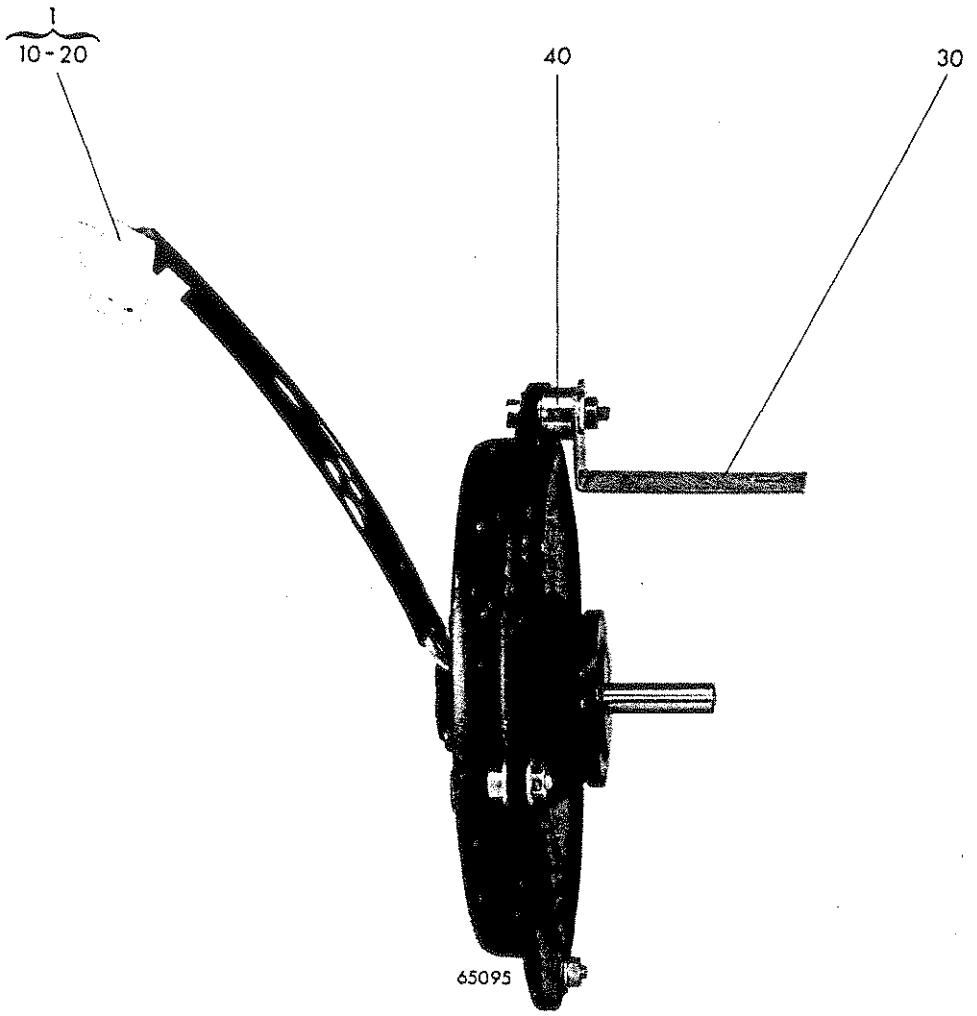


PLATE 12 PRINTING FRAME

1	2	3 1 2 3 4 5 6 7	4		5
360	23079327-3	CLAMP ASSEMBLY	23079327-3	53840	01
	15600143-7	SCREW CHC M3X12	E27161-30Q12QVUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
-361	**********	• CLAMP	**********		01
-362	**********	• SPRING	**********		01
-363	**********	• BALL	**********		01
370	12410276-4	INSULATOR	LXA77C	50095	04
380	23059586-2	EARTHING BAND	23059586-2	53840	04
390	**********	RIGHT GUIDANCE SHAFT	**********		01
400	**********	LEFT GUIDANCE SHAFT	**********		01
410	**********	BELT TENSIONER CASTING	**********		01
420	**********	WASHER	**********		02
430	**********	WIRING SOCKET MOUNTING BRACKET	**********		01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	02



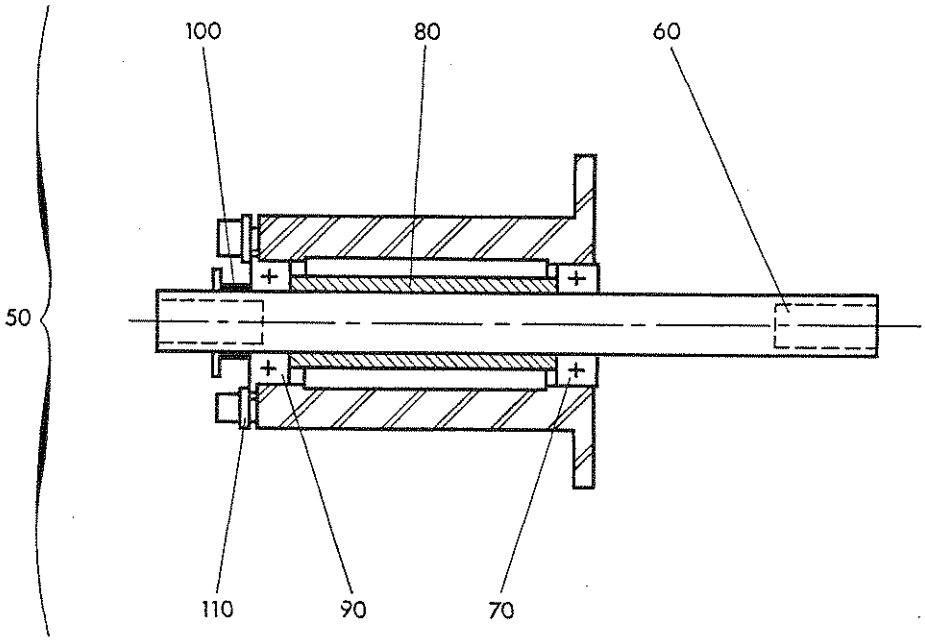


PLATE 13A DRIVE MOTOR WITH BEARING ASSEMBLY

1	2	3 1 2 3 4 5 6 7	4		5
1	23059144-7	MOTOR CABLE	23059144-7	53840	01
10	13233826-9	• CONNECTOR (2 PIN)	03-06-1022	59191	01
20	13241290-3	• FEMALE CONTACT	02-06-1103	59191	02
30	23075024-9	BRACKET	23075024-9	53840	01
40	23058845-3	SPACER	23058845-3	53840	01
	15600058-4	SCREW CHC M3X16	E27161-30M16QVUL	50035	01
	15700257-4	WASHER M3U	E27611M30AAUL	50035	01
	15500019-7	NUT M3U	E27411A30QQFUL	50035	01
50	**********	BEARING ASSEMBLY (SEE PLATE 00 ITEM 60)	**********		PM
60	23079295-3	BOLT	23079295-3	53840	01
70	12511001-7	BEARING	8X16X6	50112	01
80	23058836-7	SPACER	23058836-7	53840	01
90	12520102-4	BEARING	8X16X6ACOLLET	50112	01
100	23079297-4	SPACER	23079297-4	53840	01
110	23059128-1	CLAMP	23059128-1	53840	02
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	02

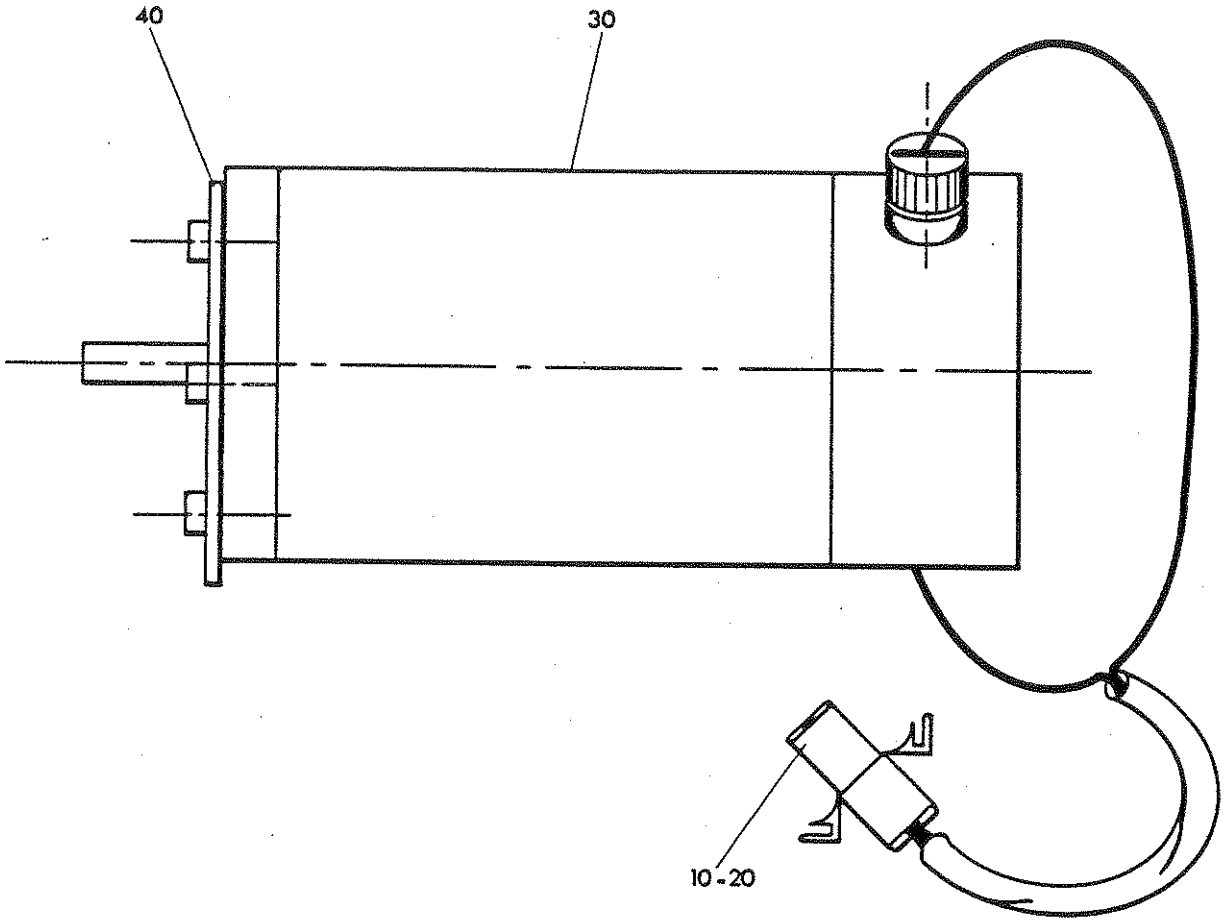


PLATE 13B DRIVE MOTOR WITH SUPPORT BRACKET

1	2	3 1 2 3 4 5 6 7	4		5
- 1	**********	MOTOR CABLE (SEE PLATE 00 ITEM 61)	**********		PM
10	13233826-9	. CONNECTOR (2 PIN)	03-06-1022	59191	01
20	13241290-3	. FEMALE CONTACT	02-06-1103	59191	02
30	26003453-9	. MOTOR	26003453-9	53840	01
40	**********	BRACKET (SEE PLATE 00 ITEM 62)	**********		PM

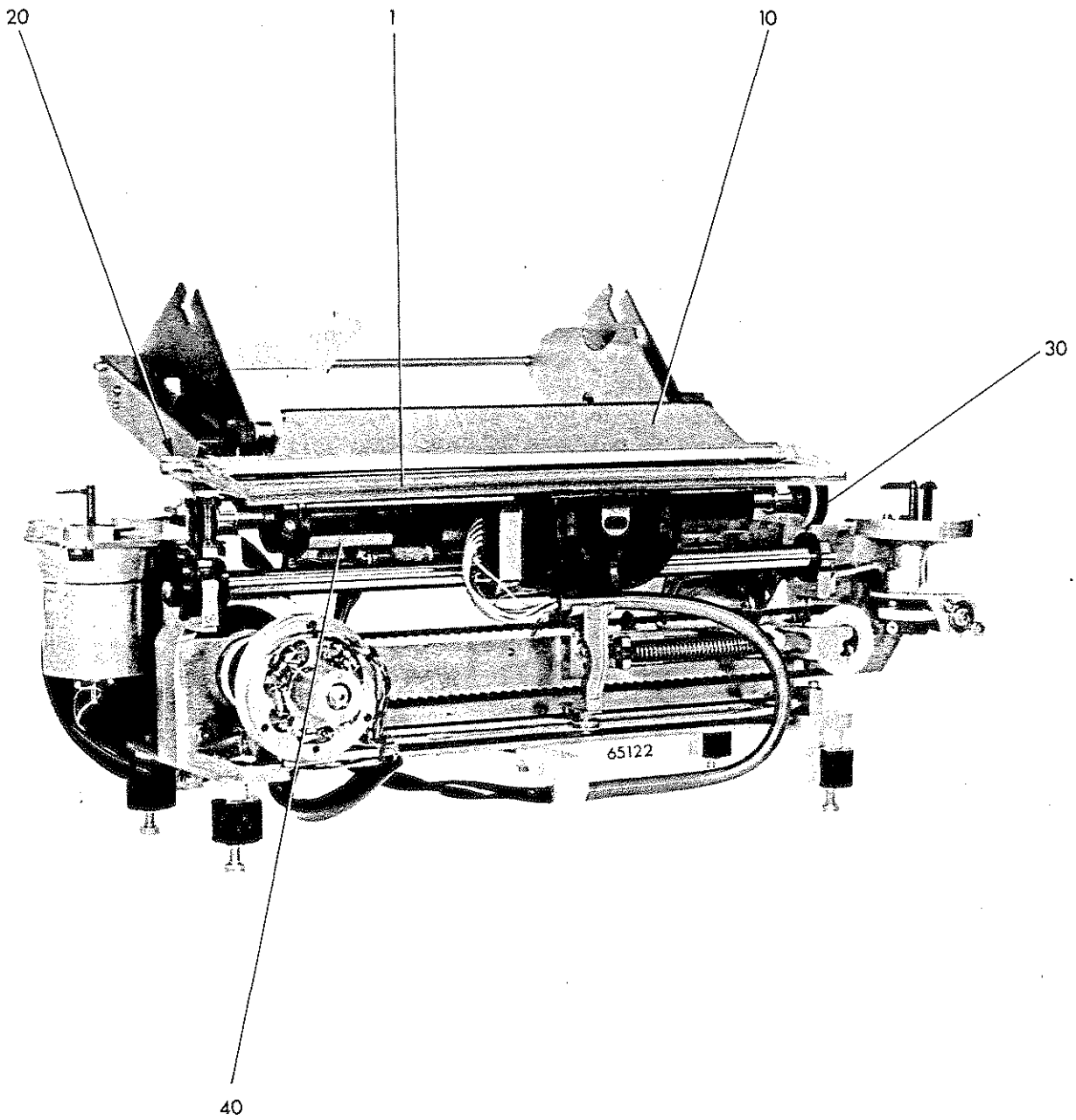


PLATE 14 MISCELLANEOUS EQUIPMENT (TELEPRINTER)

1	2	3 1 2 3 4 5 6 7	4		5
1	23075221-9	PAPER KNIFE	23075221-9	53840	01
	23075220-1	PIN SCREW	23075220-1	53840	02
10	23075090-0	DEFLECTOR	23075090-0	53840	01
	15621135-6	SCREW CL M3X6	E27116C30Q6CAUPA	50035	02
20	**********	STRIP SUPPORT	**********		02
30	12140775-8	BELT MINI-PITCH STEP	80105X1-4	50711	01
40	23059010-1	PAPERCHUTE	23059010-1	53840	01

ASSEMBLY SUMMARY SHEET
"ALIMENTATION" BOARD

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23074407-2	49	To replace extractors	15 A				
	7	Increase current limite for 5V supply. Resistor (R32) of 22 Ohms becomes 33 Ohms		23074413-4	D		
	10	Add 22 nf capacitor (C25)		23074413-4	E		
	16	Resistor R29 of 270 Ohms becomes 220 Ohms		23074413-4	F		
23117707-2	48	New board	00 15 B	23117708-5	-		
23118723-9	71 71 bis	New board	00 15 C	23118722-6	-		

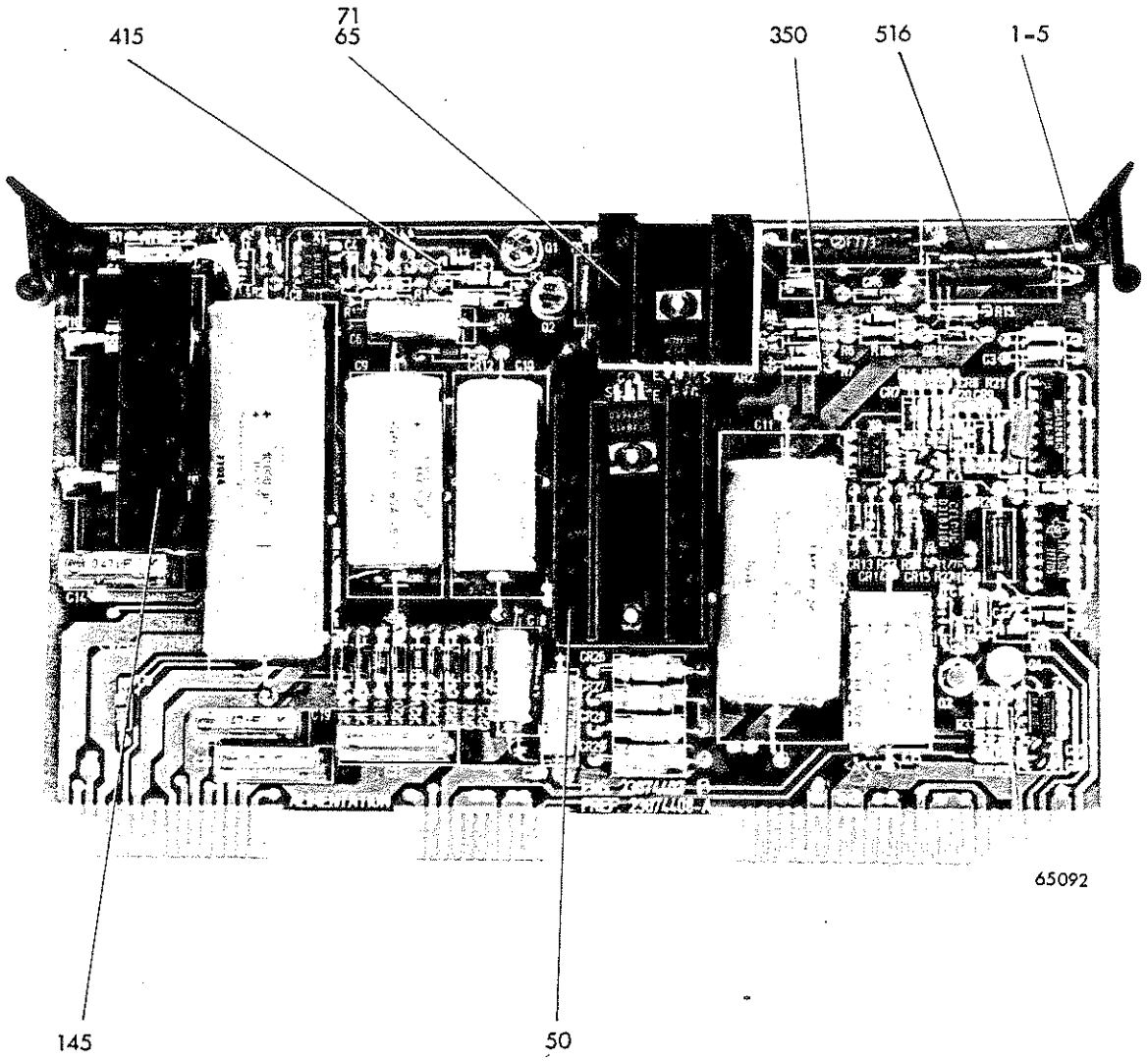


PLATE 15A "ALIMENTATION" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
40	14058189-8	INTEGRATED CIRCUIT AR01	78M15C	59705	01
	15621138-0	SCREW CL M3X12	E27116C30Q12CAUP	50035	02
	15700378-7	UNDULATING WASHER B3	B3520301-24	51689	02
	15500019-7	NUT H M3	E27411A30QQFUL	50035	02
50	23075574-4	RADIATOR	23075574-4	53840	01
60	14058189-8	INTEGRATED CIRCUIT AR02	78M15C	59705	01
	15621138-0	SCREW CL M3X12	E27116C30Q12CAUP	50035	01
	15500019-7	NUT H M3	E27411A30QQFUL	50035	01
	15700378-7	UNDULATING WASHER B3	520301-24	51689	01
65	23074414-7	RADIATOR	23074414-7	53840	01
71	23105254-3	SCREW COVER	23105254-3	53840	01
75	14239010-9	ELECTROLUMINESCENT DIODE ..... CR01 A CR04	5082-4484	51148	04
80	14018660-1	DIODE CR05	BZX79C7V5	51956	01
85	14018717-4	DIODE CR06	BZX83C2V7	10072	01
90	14019002-2	DIODE CR07-CR08	1N4148	52745	02
95	14019017-1	DIODE CR09	BZX55C4V7	10072	01
100	14018644-5	DIODE CR10	FR57A	52745	01
105	15700243-3	UNDULATING WASHER B5	520501-24	51689	01
110	13942970-8	LUG DIAM 5	2005-2	51918	01
115	14018681-2	DIODE CR11	1N4003	10072	01
116	14018965-2	DIODE CR12	BAT42	99991	01
120	14018657-3	DIODE CR13	BZX55C3V9	52183	01
125	14019002-2	DIODE CR14-CR15	1N4148	52745	02
130	14018644-5	DIODE CR16	FR57A	52745	01
135	15700243-3	UNDULATING WASHER B5	520501-24	51689	01
140	13942970-8	LUG DIAM 5	2005-2	51918	01
145	23075535-6	RADIATOR	23075535-6	53840	01
	15621135-6	SCREW CL M3X6	E27116C30Q6CAUPA	50035	02
155	14018681-2	DIODE ..... CR17 A CR24	1N4003	10072	09
156	14018965-2	DIODE CR25	BAT42	99991	01
160	14019007-7	DIODE ..... CR26 A CR29	F22	10072	04
165	14438280-3	CAPACITOR 20V 15MF +-20% C01	CTS13-20V15MM	52745	01
170	14438281-6	CAPACITOR 20V 2.2MF +-10% C02	CTS13-20V2M2K	52745	01
175	14438254-3	CAPACITOR 10V 4.7MF +-10% C03	CTS13-10V4M7K	52745	01
180	14458013-1	CAPACITOR 100V 47PF +-2% C04	222263810479	51956	01
185	14448430-0	CAPACITOR 250V 10NF +-10% C05	222235245103	51956	01
190	14438267-6	CAPACITOR 20V 100MF +-20% C06	CTS13-20V100MM	52745	01
195	14458017-3	CAPACITOR 100V 220PF +-2% C07	222263870221	51956	01
200	14428237-6	CAPACITOR 16V 10000MF +50-10% C08	C026-16V10GFK	52745	01
205	14428532-2	CAPACITOR 40V 2200MF +50-10% C09	CMFFP40V2G2	52169	01

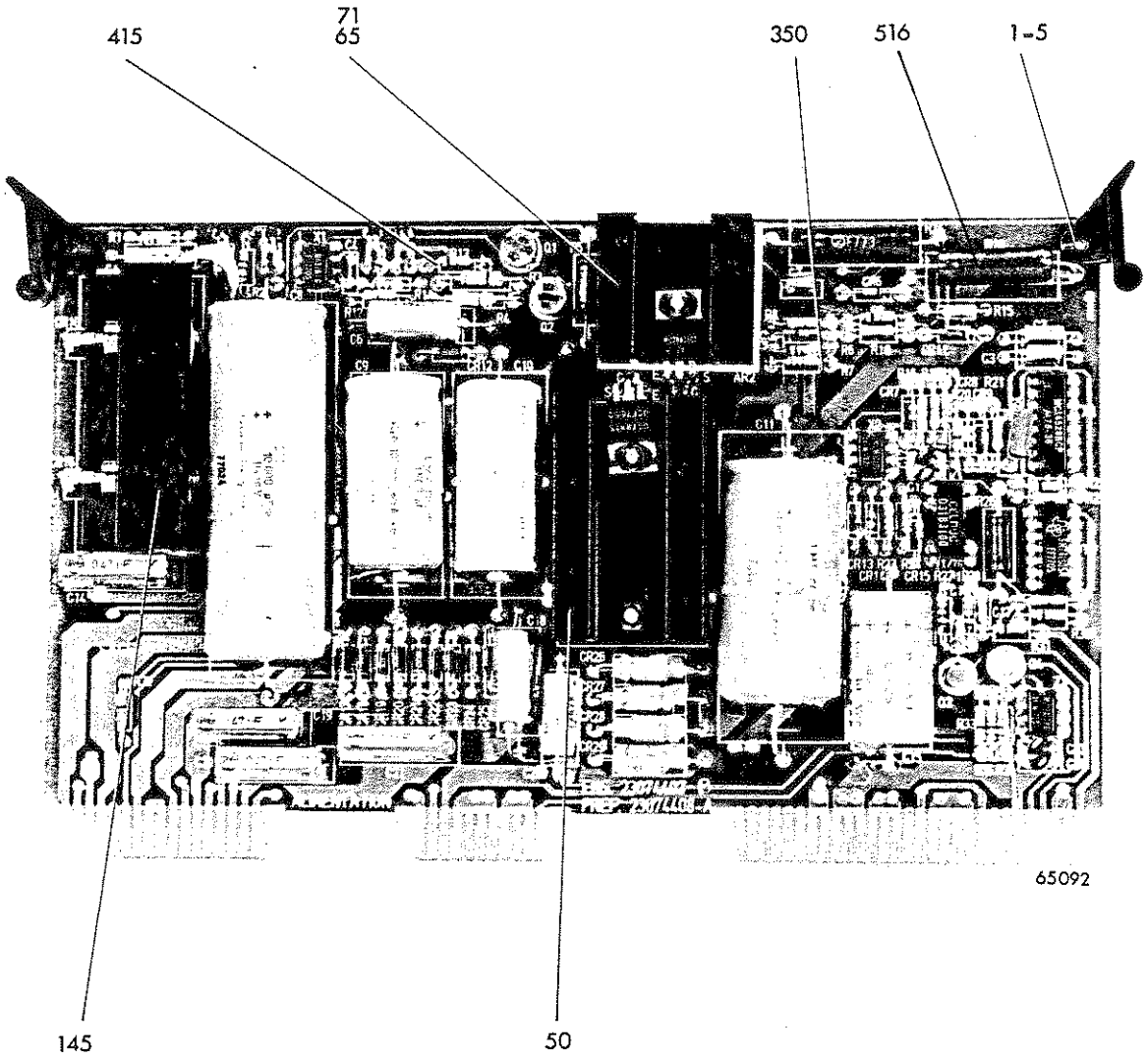


PLATE 15A "ALIMENTATION" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
210	14428508-8	CAPACITOR 40V 1000MF +50-10% C10	C026-40V1GFK	52745	01
215	14428533-0	CAPACITOR 63V 2200MF +50-10% C11	CMFFP63V2G2	52169	01
220	14458203-1	CAPACITOR 16V 22NF +80-20% C12-C13	GFB606-22KJL	51350	02
225	14448440-9	CAPACITOR 250V 0.47MF +-10% C14	222235245474	51956	02
230	14428524-4	CAPACITOR 40V 680MF +50-10% C15	C025-40V680MFK	52745	01
235	14458129-0	CAPACITOR 100V 150PF +-2% C16-C17	222263858151	51956	02
240	14438267-6	CAPACITOR 20V 100MF +-20% C18	CTS13-20V100MM	52745	01
245	14448440-9	CAPACITOR 250V 0.47MF +-10% ..... C19 A C21	222235245474	51956	03
250	14438263-4	CAPACITOR 10V 100MF +-20% C22	CTS13-10V100MM	52745	01
255	14458203-1	CAPACITOR 16V 22NF +80-20% C23-C24	GFB606-22KJL	51350	02
256	14448432-1	CAPACITOR 250V 22NF +-10% C25	222235245223	51956	01
260	13220933-0	DRY CONTACT RELAY UNDER BULB K01	D31B3100	54636	01
265	14039005-2	TRANSISTOR Q01	2N2905A	52745	01
270	14038853-1	TRANSISTOR Q02	2N2219A	52745	01
275	14039013-5	TRANSISTOR Q03	2N2907A	52745	01
280	14038854-9	TRANSISTOR Q04	2N2222A	52745	01
290	14339104-3	RESISTOR 220 OHMS +-5% 0.25W R01	RC2T220UJ	52745	01
295	14338215-6	RESISTOR 150 OHMS +-5% 0.25W R02	RC2T150UJ	52745	01
300	14338277-1	RESISTOR 680 OHMS +-5% 0.25W R03-R04	RC3T680UJ	52745	02
305	14319026-9	RESISTOR 1.5 KOHMS +-5% 3W R05	RWM4X10-1K5J	50797	01
310	14339097-1	RESISTOR 1.5 KOHMS +-5% 0.25W R06	RC2T1K5J	52745	01
315	23106122-4	RESISTOR (TO BE DETERMINED DURING TESTS) R07	23106122-4	53840	01
320	14338195-6	• RESISTOR 470 OHMS +-5% 0.25W	RC2T470UJ	52745	01
325	14338196-9	• RESISTOR 560 OHMS +-5% 0.25W	RC2T560UJ	52745	01
330	14338197-7	• RESISTOR 680 OHMS +-5% 0.25W	RC2T680UJ	52745	01
335	14338198-0	• RESISTOR 820 OHMS +-5% 0.25W	RC2T820UJ	52745	01
340	14338199-8	• RESISTOR 1 KOHM +-5% 0.25W	RC2T1KJ	52745	01
345	14338200-7	• RESISTOR 1.2 KOHMS +-5% 0.25W	RC2T1K2K	52745	01
346	14338201-0	• RESISTOR 1.5 KOHMS +-5% 0.25W	RC2T1K5J	52745	01
347	14338206-0	• RESISTOR 1.8 KOHMS +-5% 0.25W	RC2T1K8J	52745	01
348	14338212-7	• RESISTOR 2.2 KOHMS +-5% 0.25W	RC2T2K2J	52745	01
350	13941918-2	MOUNTING POST	E216P5LP2	53573	02
355	14339096-8	RESISTOR 4.7 KOHMS +-5% 0.25W R08	RC2T4K7J	52745	01
360	14339094-7	RESISTOR 1 KOHM +-5% 0.25W R09	RC2T1KJ	52745	01
365	14339126-7	RESISTOR 3.9 KOHMS +-5% 0.25W R10	RC2T3K9J	52745	01
370	14339099-2	RESISTOR 5.6 KOHMS +-5% 0.25W R11	RC2T5K6J	52745	01
375	14339109-8	RESISTOR 3.3 KOHMS +-5% 0.25W R12	RC2T3K3J	52745	01

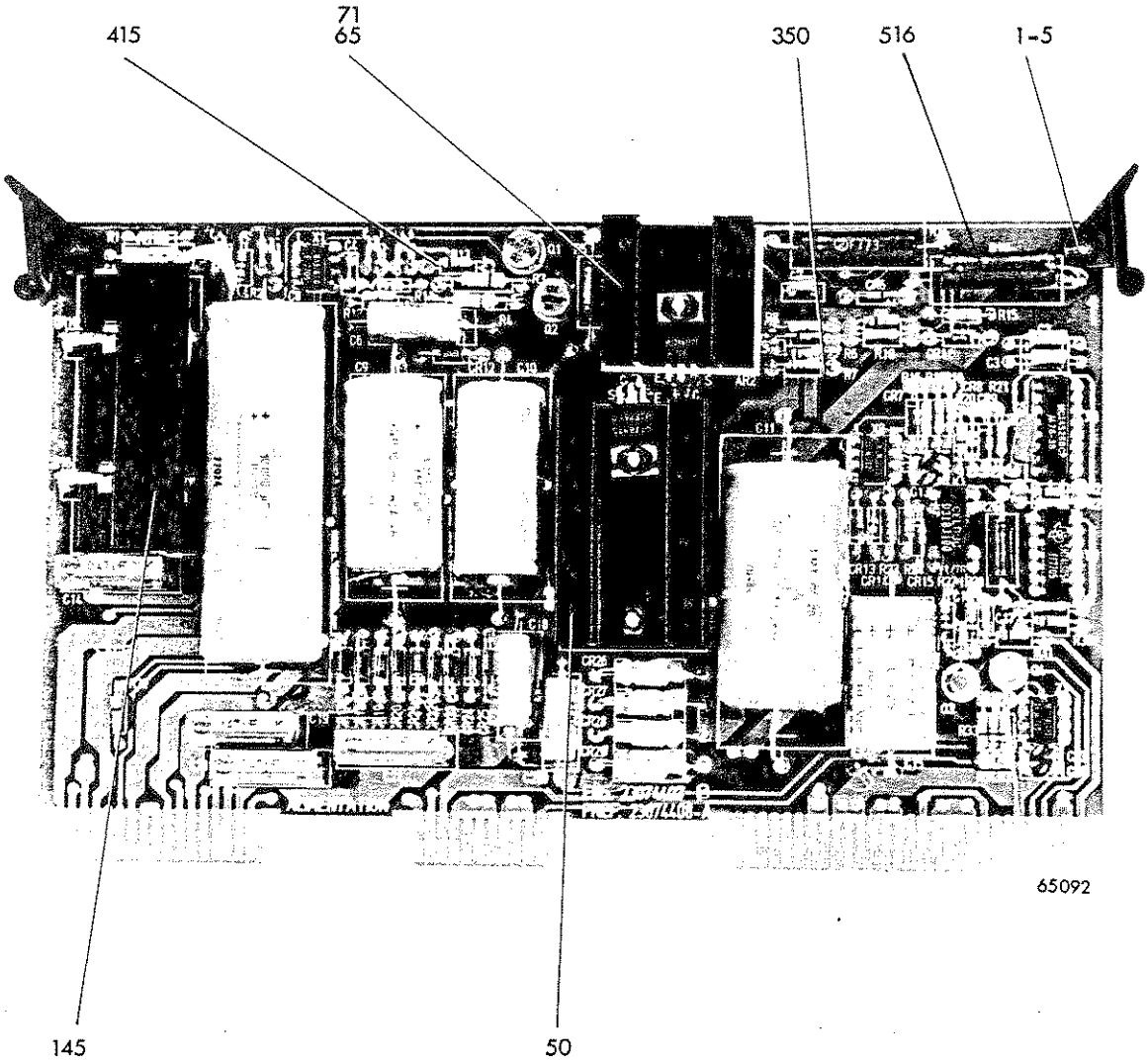


PLATE 15A "ALIMENTATION" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
380	23106122-4	RESISTOR (TO BE DETERMINED DURING TESTS) R13	23106122-4	53840	01
385	14338195-6	• RESISTOR 470 OHMS +-5% 0.25W	RC2T470UJ	52745	01
390	14338196-9	• RESISTOR 560 OHMS +-5% 0.25W	RC2T560UJ	52745	01
395	14338197-7	• RESISTOR 680 OHMS +-5% 0.25W	RC2T680UJ	52745	01
400	14338198-0	• RESISTOR 820 OHMS +-5% 0.25W	RC2T820UJ	52745	01
405	14338199-8	• RESISTOR 1 KOHM +-5% 0.25W	RC2T1KJ	52745	01
410	14338200-7	• RESISTOR 1.2 KOHMS +-5% 0.25W	RC2T1K2J	52745	01
411	14338201-0	• RESISTOR 1.5 KOHMS +-5% 0.25W	RC2T1K5J	52745	01
412	14338206-0	• RESISTOR 1.8 KOHMS +-5% 0.25W	RC2T1K8J	52745	01
413	14338212-7	• RESISTOR 2.2 KOHMS +-5% 0.25W	RC2T2K2J	52745	01
415	13941918-2	MOUNTING POST	E216P5LP2	53573	02
420	14318397-5	RESISTOR 6.8 KOHMS +-5% 6.5W R14	RWM5X26-6K8J	50797	01
425	14339093-9	RESISTOR 330 OHMS +-5% 0.25W R15	RC2T330UJ	52745	01
430	14339117-1	RESISTOR 47 KOHMS +-5% 0.25W R16	RC2T47KJ	52745	01
435	14339096-8	RESISTOR 4.7 KOHMS +-5% 0.25W R17	RC2T4K7J	52745	01
440	14339098-9	RESISTOR 2.2 KOHMS +-5% 0.25W R18	RC2T2K2J	52745	01
450	14339100-1	RESISTOR 10 KOHMS +-5% 0.25W R20	RC2T10KJ	52745	01
455	14339117-1	RESISTOR 47 KOHMS +-5% 0.25W R21	RC2T47KJ	52745	01
460	14339100-1	RESISTOR 10 KOHMS +-5% 0.25W R22	RC2T10KJ	52745	01
465	14339098-9	RESISTOR 2.2 KOHMS +-5% 0.25W R23	RC2T2K2J	52745	01
470	14339095-0	RESISTOR 1.8 KOHMS +-5% 0.25W R24	RC2T1K8J	52745	01
475	14339096-8	RESISTOR 4.7 KOHMS +-5% 0.25W R25	RC2T4K7J	52745	01
480	14318331-3	RESISTOR 330 OHMS +-5% 3W R26	RB59-330UJ	52745	01
485	14339094-7	RESISTOR 1 KOHM +-5% 0.25W R27-R28	RC2T1KJ	52745	02
490	14338298-2	RESISTOR 220 OHMS +-5% 0.5W R29	RC3T220UJ	52745	01
495	14339094-7	RESISTOR 1 KOHM +-5% 0.25W R30-R31	RC2T1KJ	52745	02
500	14338207-3	RESISTOR 33 OHMS +-5% 0.25W R32	RC2T33UJ	52745	01
505	14339100-1	RESISTOR 10 KOHMS +-5% 0.25W R33	RC2T10KJ	52745	01
510	14338072-2	RESISTOR 1 MOHM +-5% 0.25W R34	RC2T1MJ	52745	01
515	14339094-7	RESISTOR 1 KOHM +-5% 0.25W R35	RC2T1KJ	52745	01
516	14312849-5	FUSE RESISTOR 1.5 OHMS +-10% 6W R19	CW238-4	99985	01
520	14058126-5	INTEGRATED CIRCUIT X01	LM376N	18767	01
525	14058069-3	INTEGRATED CIRCUIT X02	SN72311P	52367	01
530	14049833-2	INTEGRATED CIRCUIT X03	SCL4528BE	99998	01
535	14049475-6	INTEGRATED CIRCUIT Y01	SN74LS05N	52367	01
540	14050237-1	INTEGRATED CIRCUIT Z01	741TC	59705	01

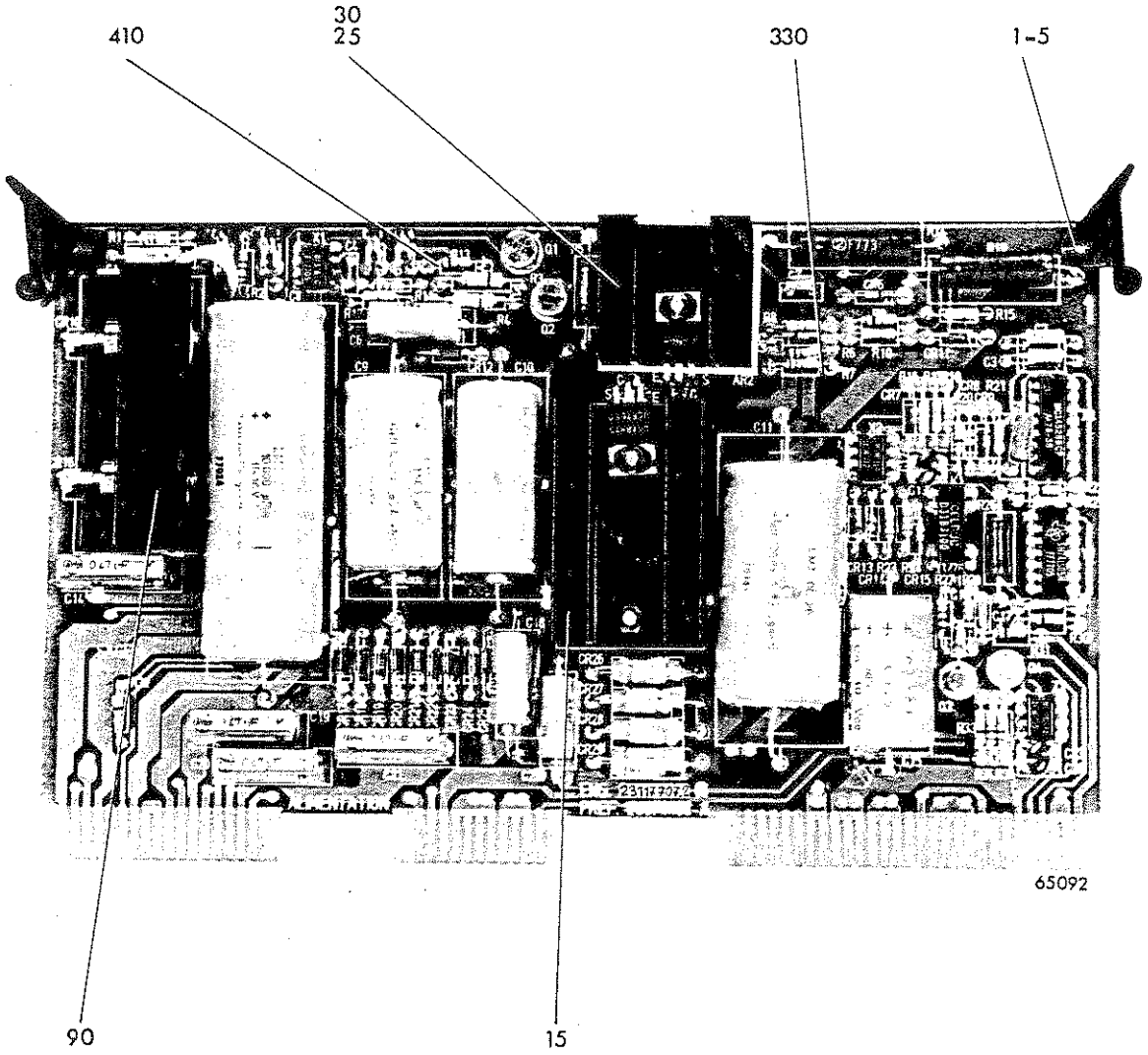


PLATE 15B "ALIMENTATION" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14058152-0	INTEGRATED CIRCUIT	MC7815CP	56687	01
		AR01			
	15621138-0	SCREW CL M3X12	E27116C30Q12CAUP	50035	02
	15700378-7	UNDULATING WASHER B3	520301-24	51689	01
	15500019-7	NUT H M3	E27411A30QQFUL	50035	02
15	23075574-4	RADIATOR	23075574-4	53840	01
20	14058152-0	INTEGRATED CIRCUIT	MC7815CP	56687	01
		AR02			
	15621138-0	SCREW CL M3X12	E27116C30Q12CAUP	50035	01
	15500019-7	NUT H M3	E27411A30QQFUL	50035	01
	15700378-7	UNDULATING WASHER B3	520301-24	51689	01
25	23074414-7	RADIATOR	23074414-7	53840	01
30	23105254-3	SCREW COVER	23105254-3	53840	01
35	14239010-9	ELECTROLUMINESCENT DIODE	5082-4484	51148	04
		CR01 A CR04			
40	14018660-1	DIODE	BZX79C7V5	51956	01
		CR05			
45	14018717-4	DIODE	BZX83C2V7	10072	01
		CR06			
50	14019002-2	DIODE	1N4148	52745	02
		CR07-CR08			
55	14019017-1	DIODE	BZX55C4V7	10072	01
		CR09			
60	14018644-5	DIODE	FR57A	52745	01
		CR10			
	15700243-3	UNDULATING WASHER B5	520501-24	51689	01
	13942970-8	LUG DIAM 5	2005-2	51918	01
65	14018681-2	DIODE	1N4003	10072	01
		CR11			
70	14018965-2	DIODE	BAT42	99991	01
		CR12			
75	14018657-3	DIODE	BZX55C3V9	52183	01
		CR13			
80	14019002-2	DIODE	1N4148	52745	02
		CR14-CR15			
85	14018644-5	DIODE	FR57A	52745	01
		CR16			
	15700243-3	UNDULATING WASHER B5	520501-24	51689	01
	13942970-8	LUG DIAM 5	2005-2	51918	01
90	23075535-6	RADIATOR	23075535-6	53840	01
	15621135-6	SCREW CL M3X6	E27116C30Q6CAUPA	50035	02
95	14018681-2	DIODE	1N4003	10072	08
		CR17 A CR24			
100	14018965-2	DIODE	BAT42	99991	01
		CR25			
105	14019007-7	DIODE	F22	10072	04
		CR26 A CR29			
110	14018681-2	DIODE	1N4003	10072	01
		CR30			
115	14018965-2	DIODE	BAT42	99991	01
		CR31			
120	14018681-2	DIODE	1N4003	10072	02
		CR32-CR33			
125	14438280-3	CAPACITOR 20V 15MF +-20%	CTS13-20V15MM	52745	01
		C01			
130	14438281-6	CAPACITOR 20V 2.2MF +-10%	CTS13-20V2M2K	52745	01
		C02			
135	14438254-3	CAPACITOR 10V 4.7MF +-10%	CTS13-10V4M7K	52745	01
		C03			
140	14458013-1	CAPACITOR 100V 47PF +-2%	222263810479	51956	01
		C04			
145	14448430-0	CAPACITOR 250V 10NF +-10%	222235245103	51956	01
		C05			
150	14438267-6	CAPACITOR 20V 100MF +-20%	CTS13-20V100MM	52745	01
		C06			
155	14458017-3	CAPACITOR 100V 220PF +-2%	222263870221	51956	01
		C07			

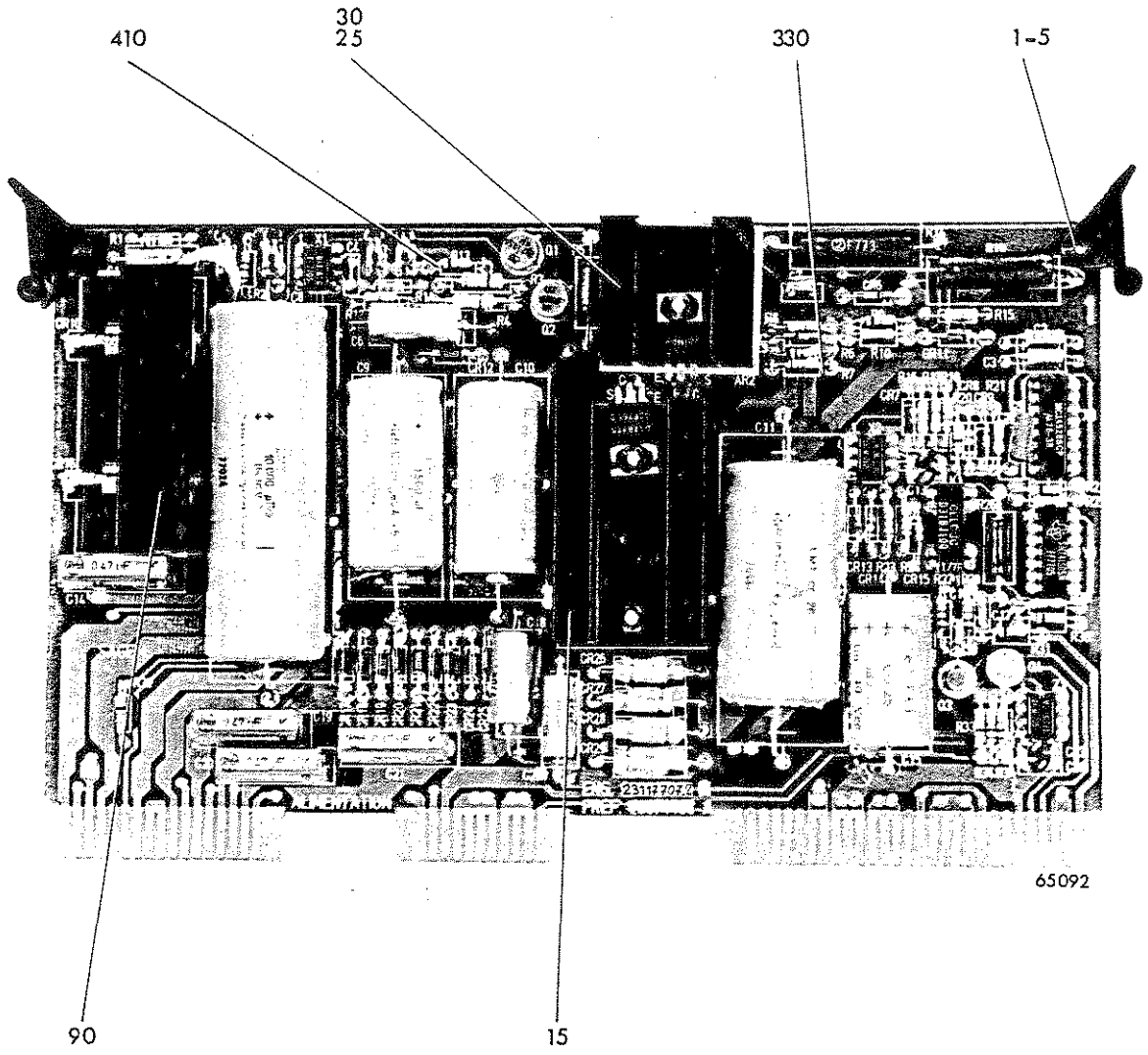


PLATE 15B "ALIMENTATION" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
160	14428237-6	CAPACITOR 16V 10000MF +50-10% C08	C026-16V10GFK	52745	01
165	14428532-2	CAPACITOR 40V 2200MF +50-10% C09	CMFFP40V2G2	52169	01
170	14428508-8	CAPACITOR 40V 1000MF +50-10% C10	C026-40V1GFK	52745	01
175	14428533-0	CAPACITOR 63V 2200MF +50-10% C11	CMFFP63V2G2	52169	01
180	14458203-1	CAPACITOR 16V 22NF +80-20% C12-C13	GFB606-22KJL	51350	02
185	14448440-9	CAPACITOR 250V 0.47MF +-10% C14	222235245474	51956	02
190	14428524-4	CAPACITOR 40V 680MF +50-10% C15	C025-40V680MFK	52745	01
195	14458129-0	CAPACITOR 100V 150PF +-2% C16-C17	222263858151	51956	02
200	14438267-6	CAPACITOR 20V 100MF +-20% C18	CTS13-20V100MM	52745	01
205	14448440-9	CAPACITOR 250V 0.47MF +-10% ..... C19 A C21	222235245474	51956	03
210	14438263-4	CAPACITOR 10V 100MF +-20% C22	CTS13-10V100MM	52745	01
215	14458203-1	CAPACITOR 16V 22NF +80-20% C23-C24	GFB606-22KJL	51350	02
220	14448432-1	CAPACITOR 250V 22NF +-10% C25	222235245223	51956	01
225	13220933-0	DRY CONTACT RELAY UNDER BULB K01	D31B3100	54636	01
230	14039005-2	TRANSISTOR Q01	2N2905A	52745	01
235	14038853-1	TRANSISTOR Q02	2N2219A	52745	01
240	14039013-5	TRANSISTOR Q03	2N2907A	52745	01
245	14038854-9	TRANSISTOR Q04	2N2222A	52745	01
250	14339104-3	RESISTOR 220 OHMS +-5% 0.25W R01	RC2T220UJ	52745	01
255	14338215-6	RESISTOR 150 OHMS +-5% 0.25W R02	RC2T150UJ	52745	01
260	14338277-1	RESISTOR 680 OHMS +-5% 0.25W R03-R04	RC3T680UJ	52745	02
270	14319026-9	RESISTOR 1.5 KOHMS +-5% 3W R05	RWM4X10-1K5J	50797	01
275	14339097-1	RESISTOR 1.5 KOHMS +-5% 0.25W R06	RC2T1K5J	52745	01
280	23106122-4	RESISTOR (TO BE DETERMINED DURING TESTS) R07	23106122-4	53840	01
285	14338195-6	. RESISTOR 470 OHMS +-5% 0.25W	RC2T470UJ	52745	01
290	14338196-9	. RESISTOR 560 OHMS +-5% 0.25W	RC2T560UJ	52745	01
295	14338197-7	. RESISTOR 680 OHMS +-5% 0.25W	RC2T680UJ	52745	01
300	14338198-0	. RESISTOR 820 OHMS +-5% 0.25W	RC2T820UJ	52745	01
305	14338199-8	. RESISTOR 1 KOHM +-5% 0.25W	RC2T1KJ	52745	01
310	14338200-7	. RESISTOR 1.2 KOHMS +-5% 0.25W	RC2T1K2J	52745	01
315	14338201-0	. RESISTOR 1.5 KOHMS +-5% 0.25W	RC2T1K5J	52745	01
320	14338206-0	. RESISTOR 1.8 KOHMS +-5% 0.25W	RC2T1K8J	52745	01
325	14338212-7	. RESISTOR 2.2 KOHMS +-5% 0.25W	RC2T2K2J	52745	01
330	13941918-2	MOUNTING POST	E216P5LP2	53573	02
335	14339096-8	RESISTOR 4.7 KOHMS +-5% 0.25W R08	RC2T4K7J	52745	01
340	14339094-7	RESISTOR 1 KOHM +-5% 0.25W R09	RC2T1KJ	52745	01
345	14339126-7	RESISTOR 3.9 KOHMS +-5% 0.25W R10	RC2T3K9J	52745	01
350	14339099-2	RESISTOR 5.6 KOHMS +-5% 0.25W R11	RC2T5K6J	52745	01
355	14339109-8	RESISTOR 3.3 KOHMS +-5% 0.25W R12	RC2T3K3J	52745	01

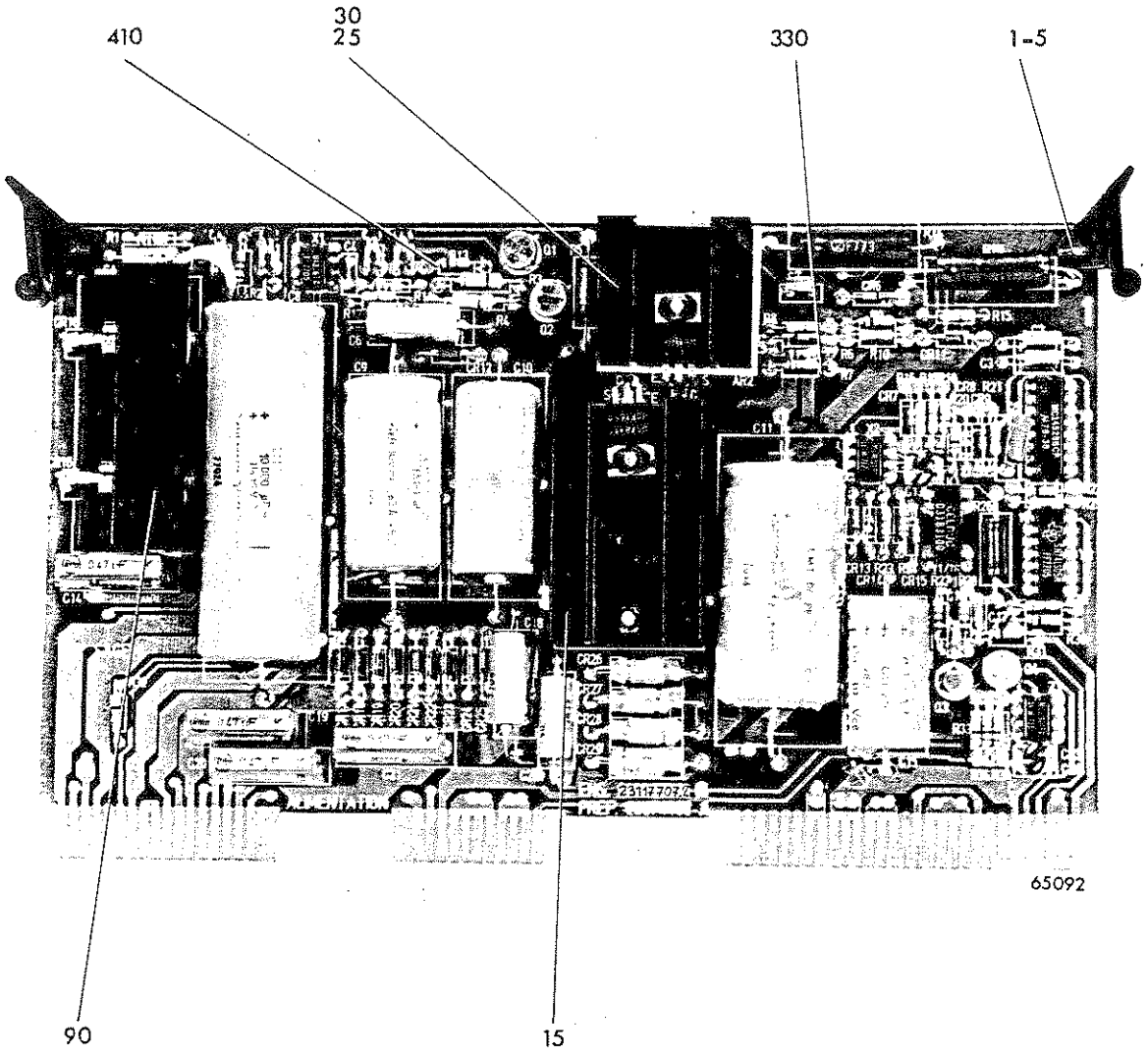


PLATE 15B "ALIMENTATION" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
360	23106122-4	RESISTOR (TO BE DETERMINED DURING TESTS) R13	23106122-4	53840	01
365	14338195-6	• RESISTOR 470 OHMS +-5% 0.25W	RC2T470UJ	52745	01
370	14338196-9	• RESISTOR 560 OHMS +-5% 0.25W	RC2T560UJ	52745	01
375	14338197-7	• RESISTOR 680 OHMS +-5% 0.25W	RC2T680UJ	52745	01
380	14338198-0	• RESISTOR 820 OHMS +-5% 0.25W	RC2T820UJ	52745	01
385	14338199-8	• RESISTOR 1 KOHM +-5% 0.25W	RC2T1KJ	52745	01
390	14338200-7	• RESISTOR 1.2 KOHMS +-5% 0.25W	RC2T1K2J	52745	01
395	14338201-0	• RESISTOR 1.5 KOHMS +-5% 0.25W	RC2T1K5J	52745	01
400	14338206-0	• RESISTOR 1.8 KOHMS +-5% 0.25W	RC2T1K8J	52745	01
405	14338212-7	• RESISTOR 2.2 KOHMS +-5% 0.25W	RC2T2K2J	52745	01
410	13941918-2	MOUNTING POST	E216P5LP2	53573	02
415	14318397-5	RESISTOR 6.8 KOHMS +-5% 6.5W R14	RWM5X26-6K8J	50797	01
420	14339093-9	RESISTOR 330 OHMS +-5% 0.25W R15	RC2T330UJ	52745	01
425	14339117-1	RESISTOR 47 KOHMS +-5% 0.25W R16	RC2T47KJ	52745	01
430	14339096-8	RESISTOR 4.7 KOHMS +-5% 0.25W R17	RC2T4K7J	52745	01
435	14339098-9	RESISTOR 2.2 KOHMS +-5% 0.25W R18	RC2T2K2J	52745	01
440	14318353-2	RESISTOR 1.5 OHMS +-5% 6.5W R19	RB57-1U5J	52745	01
445	14339100-1	RESISTOR 10 KOHMS +-5% 0.25W R20	RC2T10KJ	52745	01
450	14339117-1	RESISTOR 47 KOHMS +-5% 0.25W R21	RC2T47KJ	52745	01
455	14339100-1	RESISTOR 10 KOHMS +-5% 0.25W R22	RC2T10KJ	52745	01
460	14339098-9	RESISTOR 2.2 KOHMS +-5% 0.25W R23	RC2T2K2J	52745	01
465	14339095-0	RESISTOR 1.8 KOHMS +-5% 0.25W R24	RC2T1K8J	52745	01
470	14339096-8	RESISTOR 4.7 KOHMS +-5% 0.25W R25	RC2T4K7J	52745	01
475	14318331-3	RESISTOR 330 OHMS +-5% 3W R26	RB59-330UJ	52745	01
480	14339094-7	RESISTOR 1 KOHM +-5% 0.25W R27-R28	RC2T1KJ	52745	02
485	14338298-2	RESISTOR 220 OHMS +-5% 0.5W R29	RC3T220UJ	52745	01
490	14339094-7	RESISTOR 1 KOHM +-5% 0.25W R30-R31	RC2T1KJ	52745	02
495	14338207-3	RESISTOR 33 OHMS +-5% 0.25W R32	RC2T33UJ	52745	01
500	14339100-1	RESISTOR 10 KOHMS +-5% 0.25W R33	RC2T10KJ	52745	01
505	14338072-2	RESISTOR 1 MOHM +-5% 0.25W R34	RC2T1MJ	52745	01
510	14339094-7	RESISTOR 1 KOHM +-5% 0.25W R35	RC2T1KJ	52745	01
515	14058126-5	INTEGRATED CIRCUIT X01	LM376N	18767	01
520	14058069-3	INTEGRATED CIRCUIT X02	SN72311P	52367	01
525	14049833-2	INTEGRATED CIRCUIT X03	SCL4528BE	99998	01
530	14049475-6	INTEGRATED CIRCUIT Y01	SN74LS05N	52367	01
535	14058110-8	INTEGRATED CIRCUIT Z01	SN72741P	52367	01

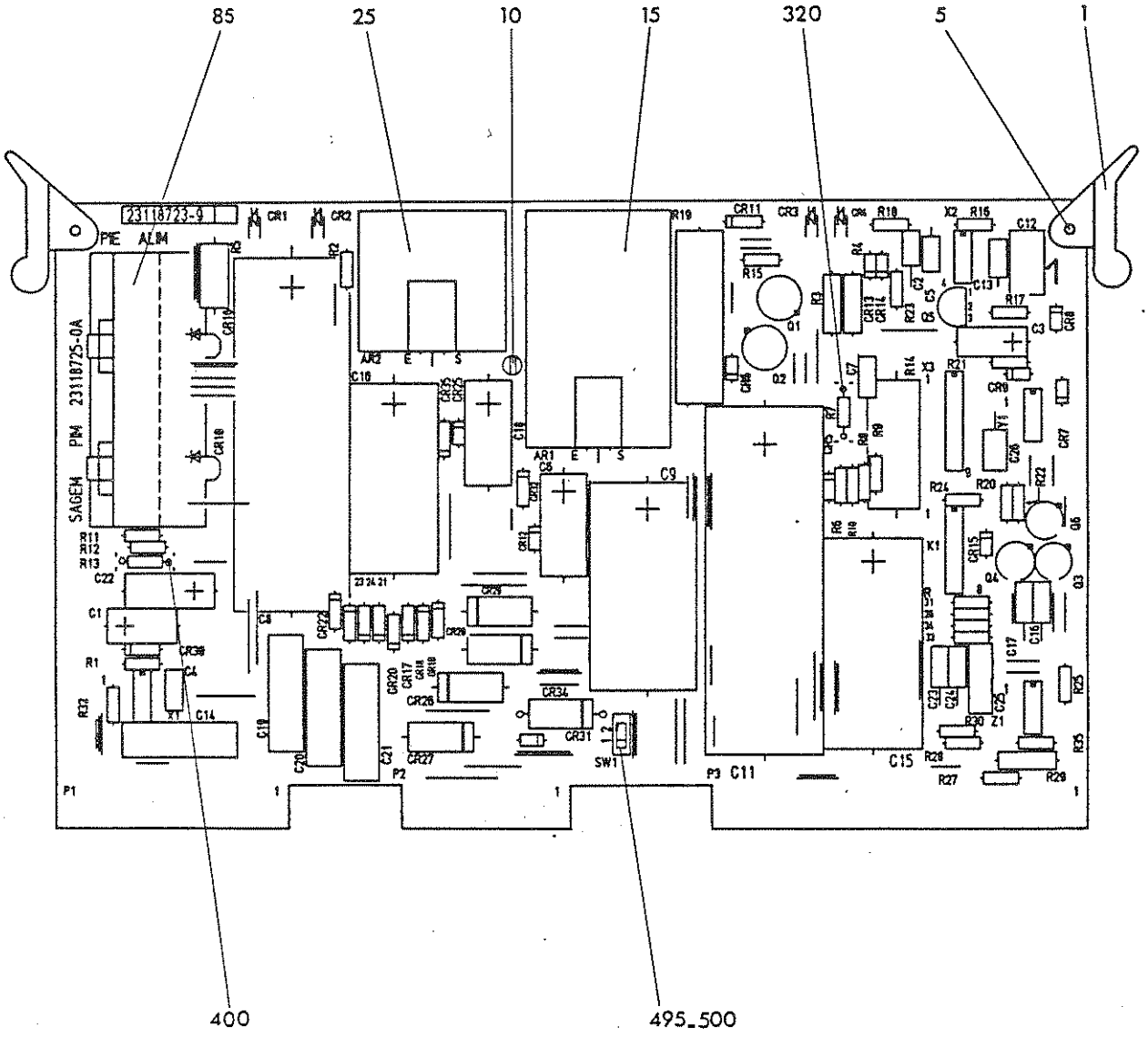


PLATE 15C "ALIMENTATION" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	13944149-9	SPACING	PS4R	59191	01
15	23075574-4	RADIATOR	23075574-4	53840	01
20	14058152-0	INTEGRATED CIRCUIT AR01	SFC2815EC	99991	01
	15621138-0	SCREW CL M3-12	E27116C30Q12CAUP	50035	02
	15500019-7	NUT H M3U	E27411A30QQFUL	50035	02
	15700378-7	UNDULATING WASHER B3	520301-24	51689	02
25	23074414-7	RADIATOR	23074414-7	53840	01
30	14058152-0	INTEGRATED CIRCUIT AR02	SFC2815EC	99991	01
	15621138-0	SCREW CL M3-12	E27116C30Q12CAUP	50035	02
	15500019-7	NUT H M3U	E27411A30QQFUL	50035	02
	15700378-7	UNDULATING WASHER B3	520301-24	51689	02
35	14239010-9	ELECTROLUMINESCENT DIODE ..... CR01 A CR04	5082-4484	51148	04
40	14018660-1	DIODE CR05	BZX79C7V5	51956	01
45	14018717-4	DIODE CR06	BZX83C2V7	10072	01
50	14019002-2	DIODE ..... CR07 A CR09	1N4148	52745	03
55	14019032-9	DIODE CR10	G3010	99991	01
	15700243-3	UNDULATING WASHER B5	520501-24	51689	01
60	14018681-2	DIODE CR11	1N4003	10072	01
65	14018965-2	DIODE CR12	BAT42	99991	01
70	14018657-3	DIODE CR13	BZX55C3V9	52183	01
75	14019002-2	DIODE CR14-CR15	1N4003	10072	02
80	14019032-9	DIODE CR16	G3010	99991	01
	15700243-3	UNDULATING WASHER B5	520501-24	51689	01
85	23118705-7	RADIATOR	23118705-7	53840	01
	15621135-6	SCREW CL M3X6	E27116C30Q12CAUP	50035	02
	15700378-7	UNDULATING WASHER B3	520301-24	51689	02
90	14018681-2	DIODE ..... CR17 A CR24	1N4003	10072	08
95	14018965-2	DIODE CR25	BAT42	99991	01
100	14019007-7	DIODE ..... CR26 A CR29	F22	10072	04
105	14018681-2	DIODE CR30	1N4003	10072	01
108	14018965-2	DIODE CR31	BAT42	99991	01
110	14018681-2	DIODE CR32	1N4003	10072	01
112	14019223-7	DIODE CR34	PFZ6VB	99991	01
113	14018681-2	DIODE CR35	1N4003	10072	01
115	14425224-0	CAPACITOR 40V 15MF +-20% C01	222201517159	51956	01
120	14458130-2	CAPACITOR 330PF +-10% 63V C02	222263003331	51956	01
125	14428449-5	CAPACITOR 63V 4.7MF +-10% C03	222201590003	51956	01
130	14458013-1	CAPACITOR 100V 47PF +-2% C04	222263810479	51956	01
135	14458079-8	CAPACITOR 40V 22NF +80-20% C05	222262903223	51956	01

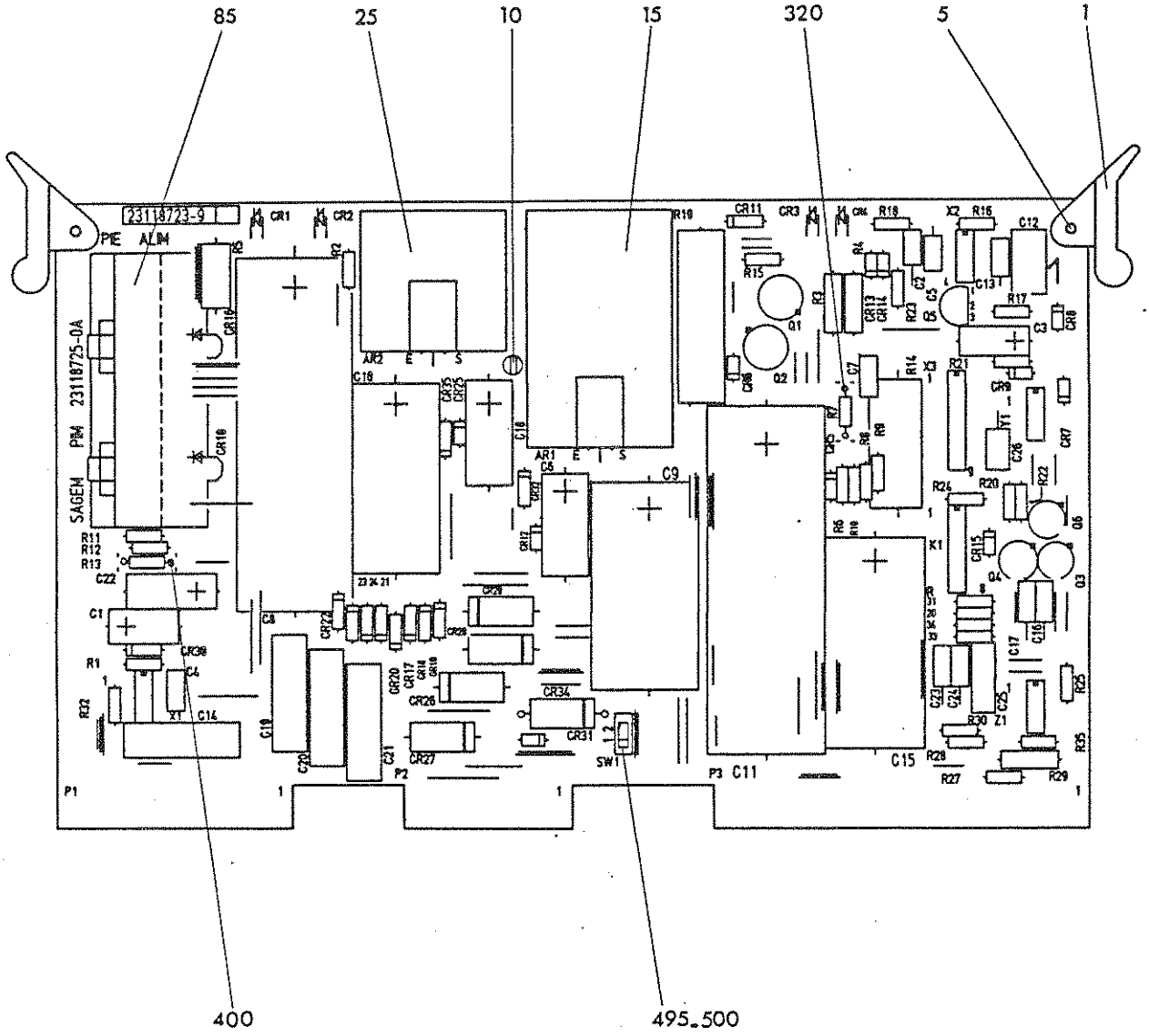


PLATE 15C "ALIMENTATION" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
140	14428443-2	CAPACITOR 25V 100MF -10+50% C06	222201616101	51956	01
145	14458017-3	CAPACITOR 100V 220PF +-2% C07	222263870221	51956	01
150	14428633-2	CAPACITOR 16V 10000MF -10+50% C08	RELSIC125-16V10G	52169	01
155	14428354-7	CAPACITOR 40V 2200MF +50-10% C09	C026-40V2G2FK	52745	01
160	14428508-8	CAPACITOR 40V 1000MF +50-10% C10	C026-40V1GFK	52745	01
165	14428368-3	CAPACITOR 63V 2200MF +50-10% C11	C026-63V2G2FK	52745	01
170	14448436-3	CAPACITOR 230V 0.1MF C12	222235245104	51956	01
175	14458079-8	CAPACITOR 40V 22NF +80-20% C13	222262903223	51965	01
180	14448440-9	CAPACITOR 250V 0.47MF +-10% C14	222235245474	51956	01
185	14428650-1	CAPACITOR 63V 680MF +50-10% C15	C026-63V680MFK	52745	01
190	14458129-0	CAPACITOR 100V 150PF +-2% C016-C017	222263858151	51956	02
195	14428443-2	CAPACITOR 25V 100MF -10+50% C018	222201616101	51956	01
200	14448440-9	CAPACITOR 250V 0.47MF +-10% ..... C019 A C021	222235245474	51956	03
205	14428434-6	CAPACITOR 10V 100MF -10+50% C022	222201614101	51956	01
210	14458079-8	CAPACITOR 40V 22NF +80-20% C023-C024	22262903223	51956	02
215	14448432-1	CAPACITOR 250V 22NF +-10% C025	222235245223	51956	01
220	14458130-2	CAPACITOR 330PF +-10% 63V C026	222263003331	51956	01
225	13220933-0	DRY CONTACT RELAY UNDER BULB K01	031B3100	54636	01
230	14039005-2	TRANSISTOR Q01	2N2905A	52745	01
235	14038853-1	TRANSISTOR Q02	2N2219A	52745	01
240	14039013-5	TRANSISTOR Q03	2N2907A	52745	01
245	14038854-9	TRANSISTOR Q04-Q06	2N2222A	52745	02
250	14338191-4	RESISTOR 220 OHMS +-5% 0.25W R01-R02	RC2T220UJ	52745	02
255	14338310-8	RESISTOR 820 OHMS +-5% 0.5W R03-R04	RC3T820UJ	52745	02
260	14318040-8	RESISTOR 2.2 KOHMS +-5% 3W R05	RB59-2K2J	52745	01
265	14338201-0	RESISTOR 1.5 KOHMS +-5% 0.25W R06	RC2T1K5J	52745	01
270	23106122-4	RESISTOR (TO BE DETERMINED DURING TESTS) R07	23106122-4	53840	01
275	14338195-6	. RESISTOR 470 OHMS +-5% 0.25W	RC2T470UJ	52745	01
280	14338196-9	. RESISTOR 560 OHMS +-5% 0.25W	RC2T560UJ	52745	01
285	14338197-7	. RESISTOR 680 OHMS +-5% 0.25W	RC2T680UJ	52745	01
290	14338198-0	. RESISTOR 820 OHMS +-5% 0.25W	RC2T820UJ	52745	01
295	14338199-8	. RESISTOR 1 KOHM +-5% 0.25W	RC2T1KJ	52745	01
300	14338200-7	. RESISTOR 1.2 KOHMS +-5% 0.25W	RC2T1K2J	52745	01
305	14338201-0	. RESISTOR 1.5 KOHMS +-5% 0.25W	RC2T1K5J	52745	01
310	14338206-0	. RESISTOR 1.8 KOHMS +-5% 0.25W	RC2T1K8J	52745	01
315	14338212-7	. RESISTOR 2.2 KOHMS +-5% 0.25W	RC2T2K2J	52745	01
320	13941918-2	MOUNTING POST	E216P5LP2	53573	02
325	14338219-8	RESISTOR 4.7 KOHMS +-5% 0.25W R08	RC2T4K7J	52745	01
330	14338199-8	RESISTOR 1 KOHM +-5% 0.25W R09	RC2T1KJ	52745	01
335	14338217-7	RESISTOR 3.9 KOHMS +-5% 0.25W R10	RC2T3K9J	52745	01

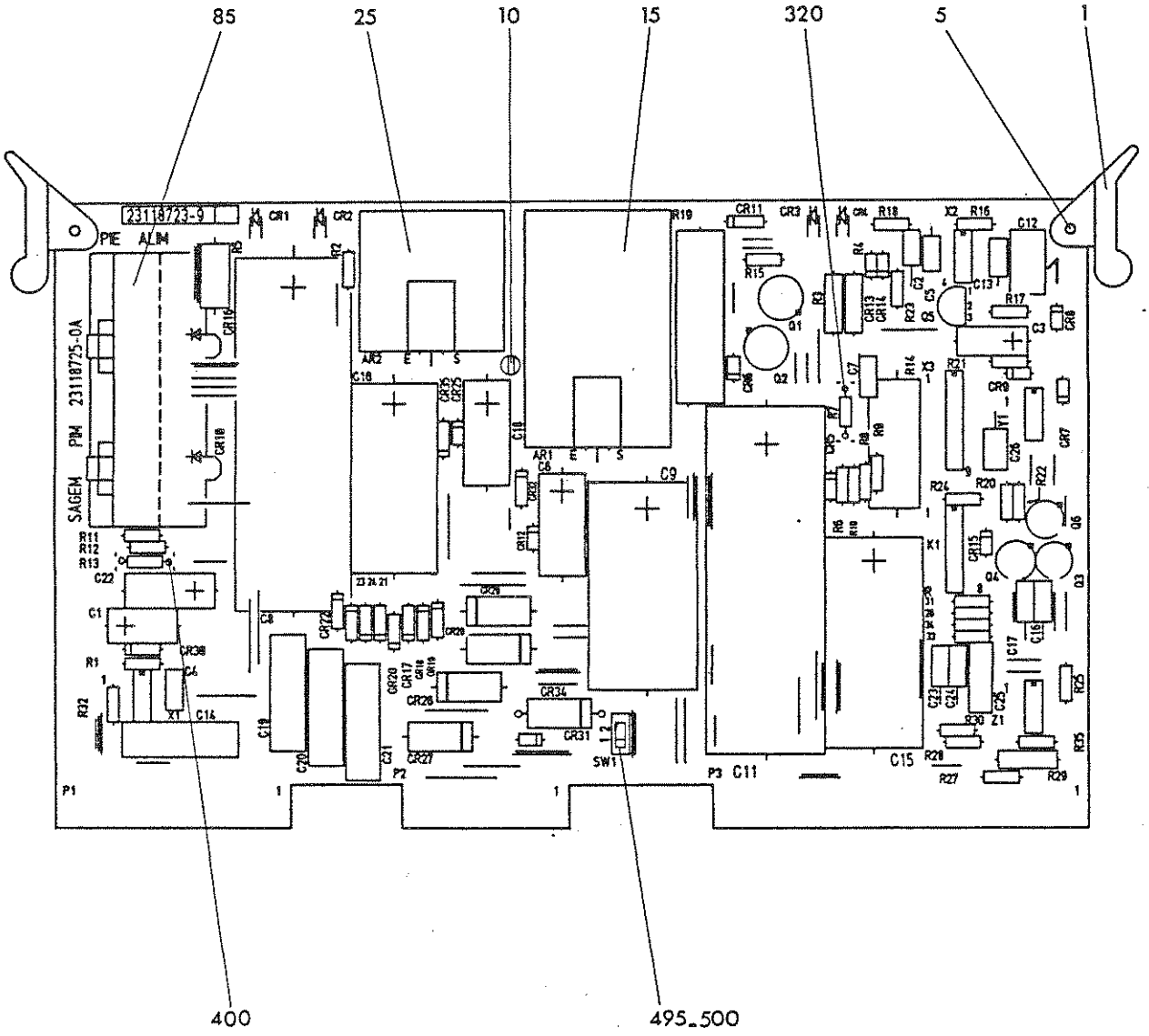


PLATE 15C "ALIMENTATION" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
340	14338221-8	RESISTOR 5.6 KOHMS +-5% 0.25W R11	RC2T5K6J	52745	01
345	14338216-9	RESISTOR 3.3 KOHMS +-5% 0.25W R12	RC2T3K3J	52745	01
330	23106122-4	RESISTOR (TO BE DETERMINED DURING TESTS) R13	23106122-4	53840	01
355	14338195-6	• RESISTOR 470 OHMS +-5% 0.25W	RC2T470UJ	52745	01
360	14338196-9	• RESISTOR 560 OHMS +-5% 0.25W	RC2T560UJ	52745	01
365	14338197-7	• RESISTOR 680 OHMS +-5% 0.25W	RC2T680UJ	52745	01
370	14338198-0	• RESISTOR 820 OHMS +-5% 0.25W	RC2T820UJ	52745	01
375	14338199-8	• RESISTOR 1 KOHM +-5% 0.25W	RC2T1KJ	52745	01
380	14338200-7	• RESISTOR 1.2 KOHMS +-5% 0.25W	RC2T1K2J	52745	01
385	14338201-0	• RESISTOR 1.5 KOHMS +-5% 0.25W	RC2T1K5J	52745	01
390	14338206-0	• RESISTOR 1.8 KOHMS +-5% 0.25W	RC2T1K8J	52745	01
395	14338212-7	• RESISTOR 2.2 KOHMS +-5% 0.25W	RC2T2K2J	52745	01
400	13941918-2	MOUNTING POST	E216P5LP2	53573	02
405	14318397-5	RESISTOR 6.8 KOHMS +-5% 6.5W R14	RWM5X26-6K8J	50797	01
410	14338193-5	RESISTOR 330 OHMS +-5% 0.25W R15	RC2T330UJ	52745	01
415	14338233-8	RESISTOR 47 KOHMS +-5% 0.25W R16	RC2T47KJ	52745	01
420	14338219-8	RESISTOR 4.7 KOHMS +-5% 0.25W R17	RC2T4K7J	52745	01
425	14338212-7	RESISTOR 2.2 KOHMS +-5% 0.25W R18	RC2T2K2J	52745	01
430	14338216-9	RESISTOR 3.3 KOHMS +-5% 0.25W R20	RC2T3K3J	52745	01
435	14338233-8	RESISTOR 47 KOHMS +-5% 0.25W R21	RC2T47KJ	52745	01
440	14338212-7	RESISTOR 2.2 KOHMS +-5% 0.25W R22-R23	RC2T2K2J	52745	02
445	14338199-8	RESISTOR 1 KOHM +-5% 0.25W R24-R25	RC2T1KJ	52745	02
450	14338225-0	RESISTOR 10 KOHMS +-5% 0.25W R26	RC2T10KJ	52745	01
455	14338199-8	RESISTOR 1 KOHM +-5% 0.25W R27-R28	RC2T1KJ	52745	02
460	14338298-2	RESISTOR 220 OHMS +-5% 3W R29	RB59-220UJ	52745	01
465	14338199-8	RESISTOR 1 KOHM +-5% 0.25W R30-R31	RC2T1KJ	52745	02
470	14338096-2	RESISTOR 33 OHMS +-5% 0.25W R32	RC2T33UJ	52745	01
475	14338225-0	RESISTOR 10 KOHMS +-5% 0.25W R33	RC2T10KJ	52745	01
480	14338250-7	RESISTOR 1 MOHM +-5% 0.25W R34	RC2T1MJ	52745	01
485	14338199-8	RESISTOR 1 KOHM +-5% 0.25W R35	RC2T1KJ	52745	01
490	14312349-5	FUSE RESISTOR 1.5 OHMS +-10% 6W R19	CW238-4	99985	01
495	13948028-0	CONNECTION STRIP	5003358	50537	01
500	13948025-6	JUMPER	2001365-08	50537	01
505	14050919-3	INTEGRATED CIRCUIT Q05	LM78L05ACZ	18767	01
510	14058126-5	INTEGRATED CIRCUIT X01	LM376N	18767	01
515	14058069-3	INTEGRATED CIRCUIT X02	SN72311P	52367	01
520	14048413-5	INTEGRATED CIRCUIT X03	F96LS02PC	59705	01
525	14058233-2	INTEGRATED CIRCUIT Y01	SFC5451D	99991	01
530	14058110-8	INTEGRATED CIRCUIT Z01	SN72741P	52367	01

ASSEMBLY SUMMARY SHEET
"ASSERVISSEMENT" BOARD

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23074415-5	49	To replace extractors	16				
	13	Replacement of 7403 N and 7404 N circuits by 74LS03 and 74LS04 ones C31-C32-C33 of 470 pF becomes 1000 pF	16	23074420-9	F	30342	
	14	To modify the value of C13 from 10 nF to 22 nF R35 from 1,5 MOhm to 390 KOhms	16	23074420-9	E	30342	

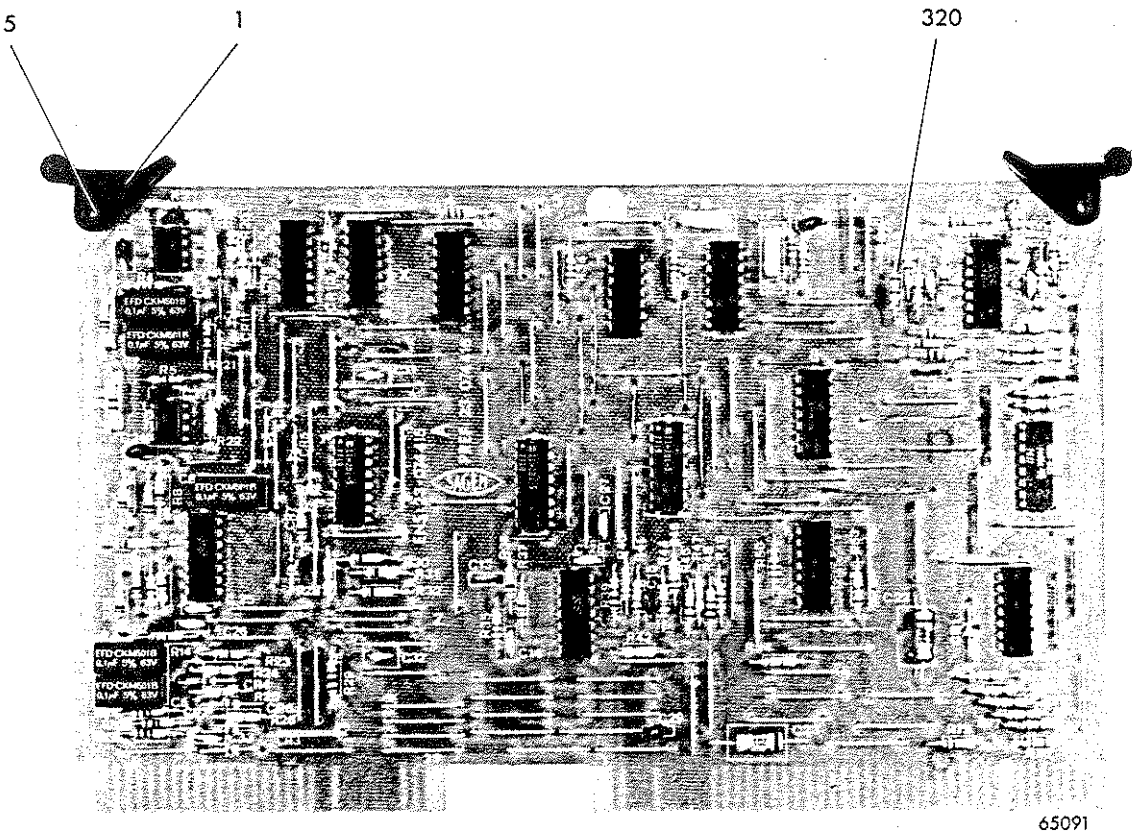


PLATE 16 "ASSERVISSEMENT" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1 5	23082278-0 15850742-4	EXTRACTOR ..... PIN SPIRAL HDK 3/32X1/4 STEEL	23082278-0 15850742-4	53840 53840	02 02
10	14018705-4	DIODE CR01	BZX46C5V1	51956	01
15	14019002-2	DIODE ..... CR02 A CR11	1N4148	52745	10
20	14458203-1	CAPACITOR 16V 22NF +80-20% ..... C01 A C03	GFB606-22KJL	51350	03
25	14448319-2	CAPACITOR 63V 0.1MF +-5% ..... C04 A C08	CKM501B63V100KJ	52745	05
30	14458203-1	CAPACITOR 16V 22NF +80-20% C13	GFB606-22KJL	51350	01
35	14458023-5	CAPACITOR 100V 2.2NF +-10% C14	222263003222	51956	01
40	14458203-1	CAPACITOR 16V 22NF +80-20% C15	GFB606-22KJL	51350	01
45	14448434-2	CAPACITOR 250V 47NF +-10% C16-C17	222235245473	51956	02
50	14458023-5	CAPACITOR 100V 2.2NF +-10% C18	222263003222	51956	01
55	14458021-4	CAPACITOR 100V 1NF +-10% C19	222263003102	51956	01
60	14458023-5	CAPACITOR 100V 2.2NF +-10% C20	222263003222	51956	01
65	14458013-1	CAPACITOR 100V 47PF +-2% C21	222263810479	51956	01
70	14428440-3	CAPACITOR 25V 10MF +50-10% C22-C23	222201516109	51956	02
75	14458203-1	CAPACITOR 16V 22NF +80-20% C24	GFB606-22KJL	51350	01
80	14458023-5	CAPACITOR 100V 2.2NF +-10% ..... C25 A C28	222263003222	51956	04
85	14458203-1	CAPACITOR 16V 22NF +80-20% C29-C30	GFB606-22KJL	51350	02
90	14458021-4	CAPACITOR 63V 1NF +-10% ..... C31 A C33	222263003102	51956	03
100	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W R01-R02	RC2T10KJ	52745	02
105	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W R03	RC2T4K7J	52745	01
110	14338218-0	RESISTOR 270 OHMS +-5% 1/4W R04	RC2T270UJ	52745	01
115	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W R05	RC2T4K7J	52745	01
120	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W ..... R06 A R11	RC2T10KJ	52745	05
125	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W R12-R13	RC2T4K7J	52745	02
130	14338218-0	RESISTOR 270 OHMS +-5% 1/4W R14	RC2T270UJ	52745	01
135	14339117-1	RESISTOR 47 KOHMS +-5% 1/4W R18	RC2T47KJ	52745	01
140	14339126-7	RESISTOR 3.9 KOHMS +-5% 1/4W R19-R20	RC2T3K9J	52745	02
145	14338218-0	RESISTOR 270 OHMS +-5% 1/4W R21	RC2T270UJ	52745	01
150	14339117-1	RESISTOR 47 KOHMS +-5% 1/4W R22	RC2T47KJ	52745	01
155	14338218-0	RESISTOR 270 OHMS +-5% 1/4W R23	RC2T270UJ	52745	01
160	14339126-7	RESISTOR 3.9 KOHMS +-5% 1/4W ..... R24 A R26	RC2T3K9J	52745	03
165	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W R27	RC2T10KJ	52745	01
170	14339117-1	RESISTOR 47 KOHMS +-5% 1/4W R28	RC2T47KJ	52745	01
175	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R29	RC2T1KJ	52745	01
180	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W ..... R30 A R32	RC2T10KJ	52745	03

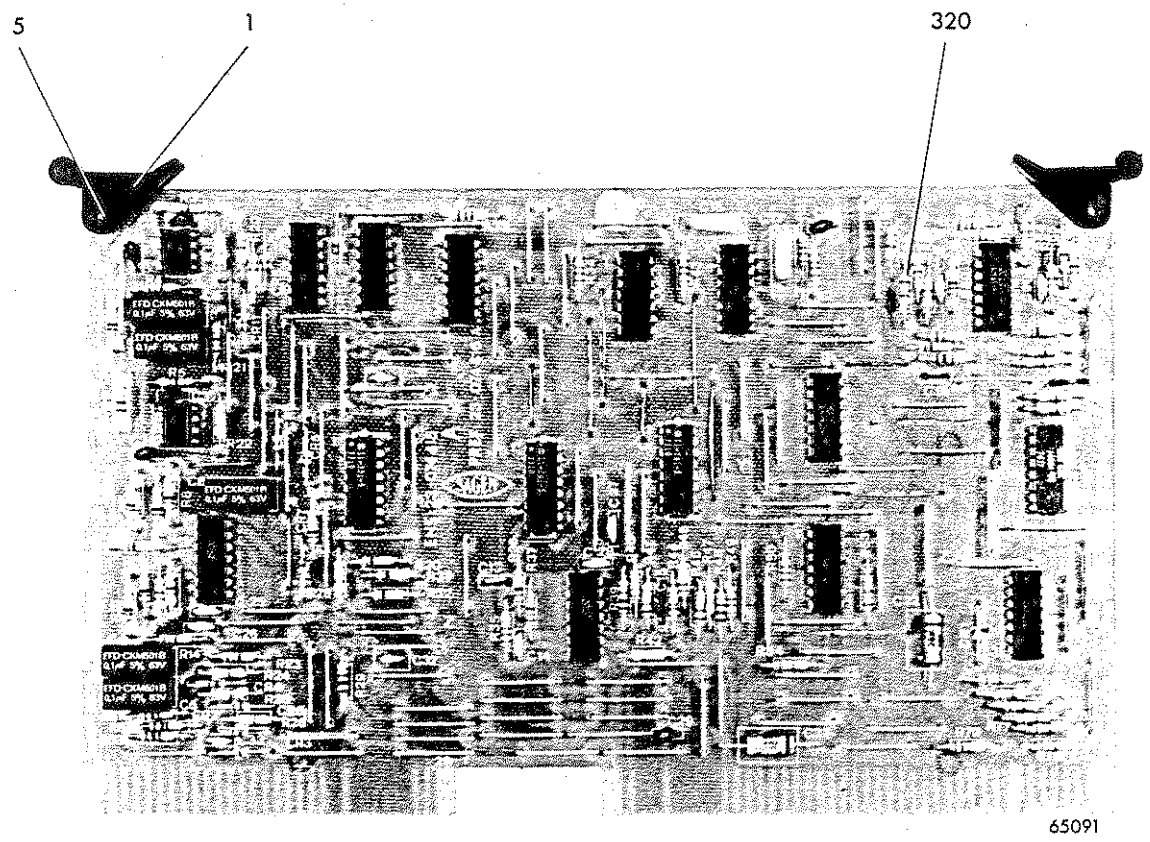


PLATE 16 "ASSERVISSEMENT" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
185	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R33-R34	RC2T2K2J	52745	02
190	14339120-4	RESISTOR 390 KOHMS +-5% 1/4W R35	RC2T390KJ	52745	01
195	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W R36	RC2T10KJ	52745	01
200	14338218-0	RESISTOR 270 OHMS +-5% 1/4W R37	RC2T270UJ	52745	01
205	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R39	RC2T1KJ	52745	01
210	14339114-2	RESISTOR 27 KOHMS +-5% 1/4W R40	RC2T27KJ	52745	01
215	14339131-1	RESISTOR 56 KOHMS +-5% 1/4W R41	RC2T56KJ	52745	01
220	14339117-1	RESISTOR 47 KOHMS +-5% 1/4W R42	RC2T47KJ	52745	01
225	14339111-8	RESISTOR 8.2 KOHMS +-5% 1/4W R43-R44	RC2T8K2J	52745	02
230	14339113-9	RESISTOR 22 KOHMS +-5% 1/4W R45	RC2T22KJ	52745	01
235	14339112-1	RESISTOR 15 KOHMS +-5% 1/4W R46	RC2T15KJ	52745	01
240	14339117-1	RESISTOR 47 KOHMS +-5% 1/4W R47	RC2T47KJ	52745	01
245	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R48	RC2T1KJ	52745	01
250	14339111-8	RESISTOR 8.2 KOHMS +-5% 1/4W R49	RC2T8K2J	52745	01
255	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R50	RC2T2K2J	52745	01
260	14339111-8	RESISTOR 8.2 KOHMS +-5% 1/4W R51	RC2T8K2J	52745	01
265	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R52	RC2T2K2J	52745	01
270	14339108-5	RESISTOR 2.7 KOHMS +-5% 1/4W R53-R54	RC2T2K7J	52745	02
275	14338220-0	RESISTOR 390 OHMS +-5% 1/4W R55	RC2T390UJ	52745	01
280	23106123-2	RESISTOR (TO BE DETERMINED DURING TESTS)	23106123-2	53840	01
285	14331235-2	. RESISTOR 200 OHMS +-5% 1/2W	RC3T200UJ	52745	01
286	14331248-0	. RESISTOR 240 OHMS +-5% 1/4W	RC2T240UJ	52745	01
287	14331249-8	. RESISTOR 300 OHMS +-5% 1/4W	RC2T300UJ	52745	01
288	14331495-0	. RESISTOR 160 OHMS +-5% 1/4W	RC2T160UJ	52745	01
289	14338214-8	. RESISTOR 120 OHMS +-5% 1/4W	RC2T120UJ	52745	01
290	14338215-6	. RESISTOR 150 OHMS +-5% 1/4W	RC2T150UJ	52745	01
291	14338318-2	. RESISTOR 110 OHMS +-5% 1/4W	RC2T110UJ	52745	01
295	14339089-8	. RESISTOR 100 OHMS +-5% 1/4W	RC2T100UJ	52745	01
300	14339092-6	. RESISTOR 180 OHMS +-5% 1/4W	RC2T180UJ	52745	01
301	14339093-9	. RESISTOR 330 OHMS +-5% 1/4W	RC2T330UJ	52745	01
310	14339104-3	. RESISTOR 220 OHMS +-5% 1/4W	RC2T220UJ	52745	01
315	14339130-8	. RESISTOR 130 OHMS +-5% 1/4W	RC2T130UJ	52745	01
320	13941918-2	MOUNTING POST	E216P5LP2	53573	02
325	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W R57-R58	RC2T4K7J	52745	02
330	14339101-4	RESISTOR 12 KOHMS +-5% 1/4W R59	RC2T12KJ	52745	01
335	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W R60	RC2T10KJ	52745	01
340	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R61	RC2T1KJ	52745	01
345	14339095-0	RESISTOR 1.8 KOHMS +-5% 1/4W R62	RC2T1K8J	52745	01
350	14339111-8	RESISTOR 8.2 KOHMS +-5% 1/4W R63	RC2T8K2J	52745	01
355	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W ..... R64 A R67	RC2T4K7J	52745	04
360	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W R68	RC2T10KJ	52745	01
365	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W ..... R69 A R72	RC2T4K7J	52745	04
370	14339108-5	RESISTOR 2.7 KOHMS +-5% 1/4W ..... R73 A R78	RC2T2K7J	52745	06

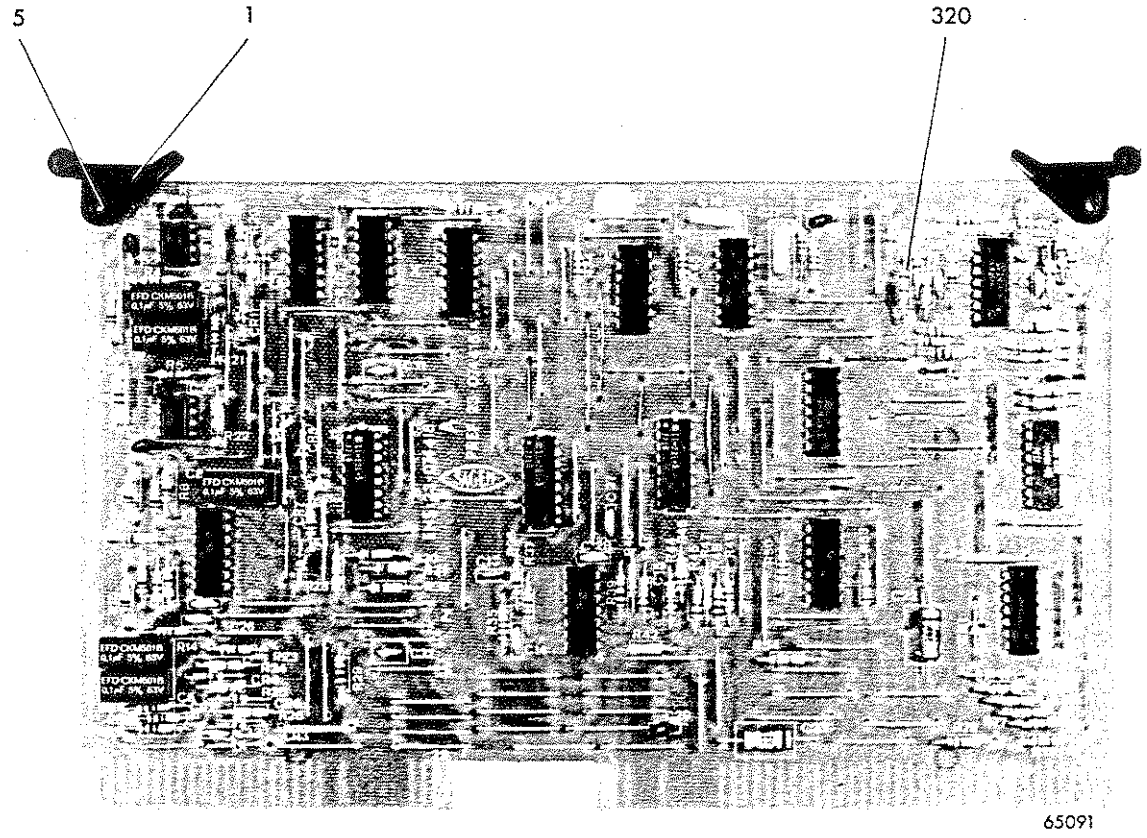


PLATE 16 "ASSERVISSEMENT" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
375	14339106-4	RESISTOR 820 OHMS +-5% 1/4W R79	RC2T820UJ	52745	01
380	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W R80	RC2T10KJ	52745	01
385	14339089-8	RESISTOR 100 OHMS +-5% 1/4W ..... R81 A R83	RC2T100UJ	52745	03
390	14058069-3	INTEGRATED CIRCUIT X01	SN72311P	52367	01
395	14049352-2	INTEGRATED CIRCUIT X02	SN74LS04N	52367	01
400	14048947-9	INTEGRATED CIRCUIT X03	SN7400N	52367	01
405	14049303-5	INTEGRATED CIRCUIT X04	SN74LS03N	52367	01
410	14048947-9	INTEGRATED CIRCUIT X06	SN7400N	52367	01
415	14049768-2	INTEGRATED CIRCUIT X07	DM8602N	18767	01
420	14058070-5	INTEGRATED CIRCUIT X09	LM348	18767	01
425	14058069-3	INTEGRATED CIRCUIT Y01	SN72311P	52367	01
430	14058066-4	INTEGRATED CIRCUIT Y03-Y05-Y06	HI201-5	54330	03
435	14048947-9	INTEGRATED CIRCUIT Y08	SN7400N	52367	01
440	14118000-9	INTEGRATED CIRCUIT Y09	MC1408L8 *	56687	01
445	14058070-5	INTEGRATED CIRCUIT Z01-Z05	LM348	18767	02
450	14049352-2	INTEGRATED CIRCUIT Z08-Z09	SN74LS04N	52367	02

ASSEMBLY SUMMARY SHEET

"PIA IMP" BOARD

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23074352-5	41-45	Reliability improvement	17 A	23074351-2	E		
	49	To replace extractors	17 A				
23117644-2	63	New board	00 17 B	23117648-4	-		
	80	30 V supervision and ribbon control		23117648-4	C		

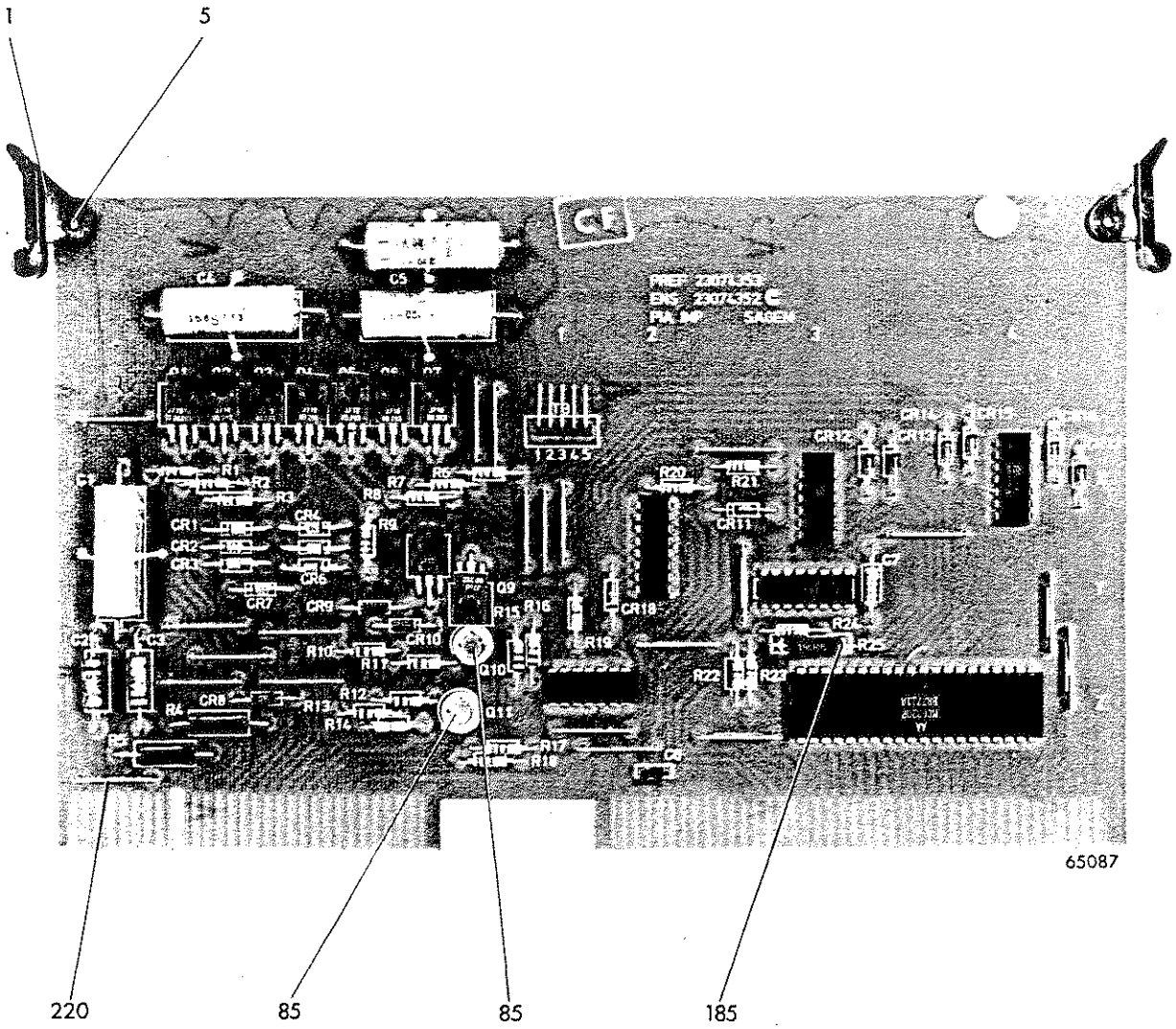


PLATE 17A "PIA IMP" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14018655-2	DIODE ..... CR01 A CR07	BZX87C24	51956	07
15	14018681-2	DIODE ..... CR08 A CR10	1N4003	10072	03
20	14019002-2	DIODE ..... CR11 A CR17	1N4148	52745	07
25	14018659-4	DIODE CR18	BZX55C5V6	52745	01
30	14428648-1	CAPACITOR 63V 220MF +50-10% C01	CMFFP63V220M	52169	01
35	14428440-3	CAPACITOR 25V 10MF +50-10% C02-C03	222201516109	51956	02
40	14428648-1	CAPACITOR 63V 220MF +50-10% C04-C05	CMFFP63V220M	52169	02
45	14458203-1	CAPACITOR 16V 22NF +80-20% C06	GFB606-22KJL	51350	01
50	14438321-9	CAPACITOR 40V 220NF +-10% C07	CTS13-40V220KK	52745	01
55	14428648-1	CAPACITOR 63V 220MF +50-10% C08	CMFFP63V220M	52169	01
60	14428433-8	CAPACITOR 10V 47MF +50-10% C09	222201514479	51956	01
65	14038362-2	TRANSISTOR ..... Q01 A Q08	BD679	18767	08
70	14038363-5	TRANSISTOR Q09	BD680	18767	01
75	14038854-9	TRANSISTOR Q10	2N2222A	52745	01
80	14039013-5	TRANSISTOR Q11	2N2907A	52745	01
90	14338214-8	RESISTOR 120 OHMS +-5% 1/4W ..... R01 A R03	RC2T120UJ	52745	03
100	14318309-0	RESISTOR 4.7 OHMS +-5% 3W R05	RB59-4U7J	52745	01
105	14338214-8	RESISTOR 120 OHMS +-5% 1/4W ..... R06 A R09	RC2T120UJ	52745	04
110	14339094-7	RESISTOR 1 KOHM +-5% 1/4W ..... R10 A R13	RC2T1KJ	52745	04
115	14339126-7	RESISTOR 3.9 KOHMS +-5% 1/4W R14	RC2T3K9J	52745	01
120	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R15-R16	RC2T1KJ	52745	02
125	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R17-R18	RC2T2K2J	52745	02
130	14339109-8	RESISTOR 1.5 KOHMS +-5% 1/4W R19	RC2T1K5J	52745	01
135	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R20-R21	RC2T2K2J	52745	02
140	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W R22-R23	RC2T4K7J	52745	02
145	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R24	RC2T2K2J	52745	01
150	23081649-8	RESISTOR (TO BE DETERMINED DURING TESTS) R25	23081649-8	53840	01
155	14328364-7	• RESISTOR 8.25 KOHMS +-1% 1/4W	RS63Y8K25F	52745	01
160	14328365-0	• RESISTOR 9.09 KOHMS +-1% 1/4W	RS63Y9K09F	52745	01
165	14329190-4	• RESISTOR 10.2 KOHMS +-1% 1/4W	RS63Y10K2F	52745	01
170	14329191-2	• RESISTOR 11.5 KOHMS +-1% 1/4W	RS63Y11K5F	52745	01
175	14329192-5	• RESISTOR 12.4 KOHMS +-1% 1/4W	RS63Y12K4F	52745	01
180	14329193-3	• RESISTOR 13.7 KOHMS +-1% 1/4W	RS63Y13K7F	52745	01
185	13941918-2	MOUNTING POST	E216P5LP2	58573	02
190	13233840-9	CONNECTOR (5 PIN) ..... TB	22-05-2051	59191	01
195	14049109-4	INTEGRATED CIRCUIT X02	SN7476N	52367	01

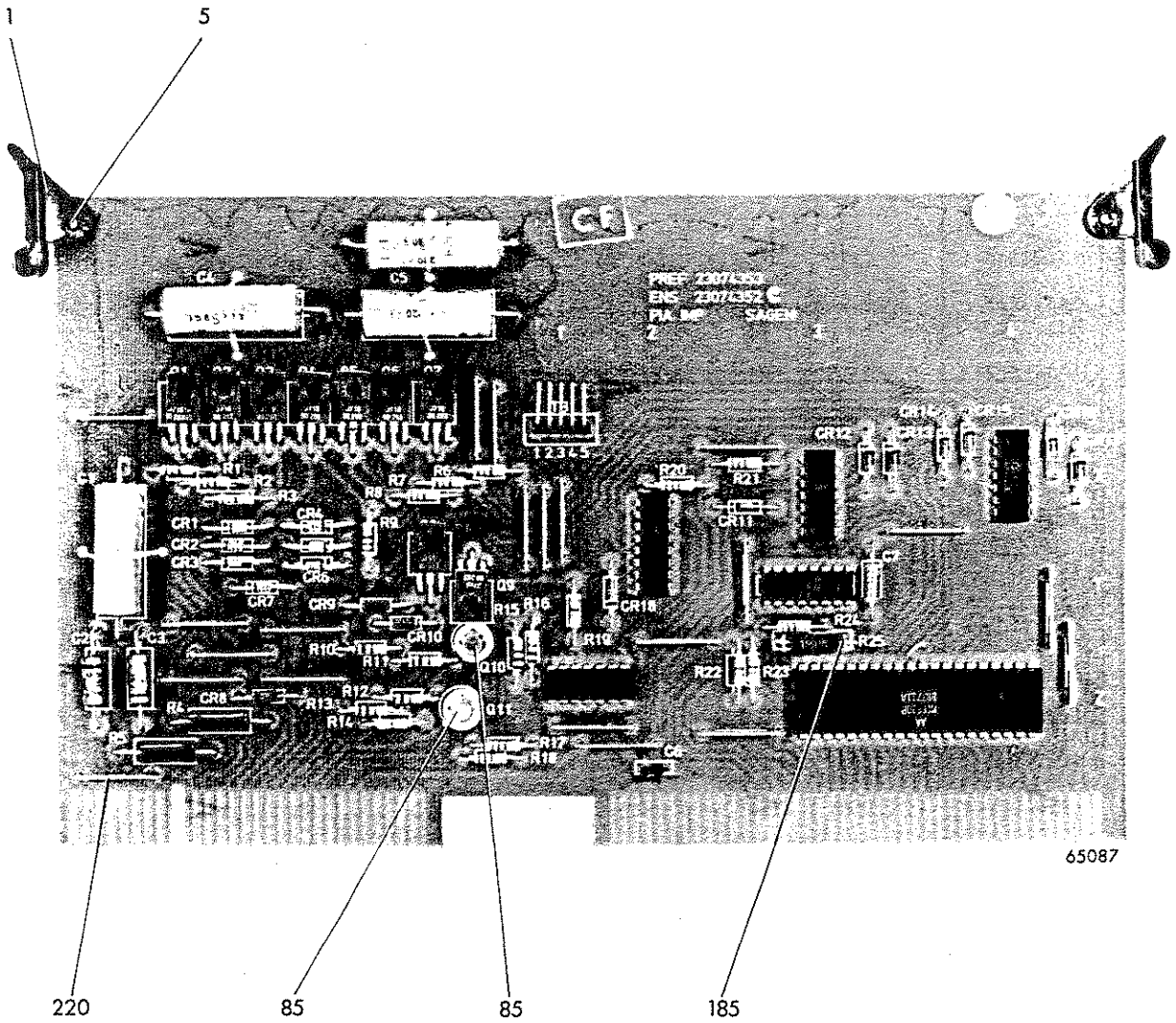


PLATE 17A "PIA IMP" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
200	14049091-4	INTEGRATED CIRCUIT X03-X04	SN7408N	52367	02
205	14049768-2	INTEGRATED CIRCUIT Y03	DM8602N	18767	01
210	14048947-9	INTEGRATED CIRCUIT Z01	SN7400N	52367	01
215	14049752-0	INTEGRATED CIRCUIT Z03	MC6821P	56687	01
220	13942135-6	MOUNTING POST	E219P5LP2	53573	21

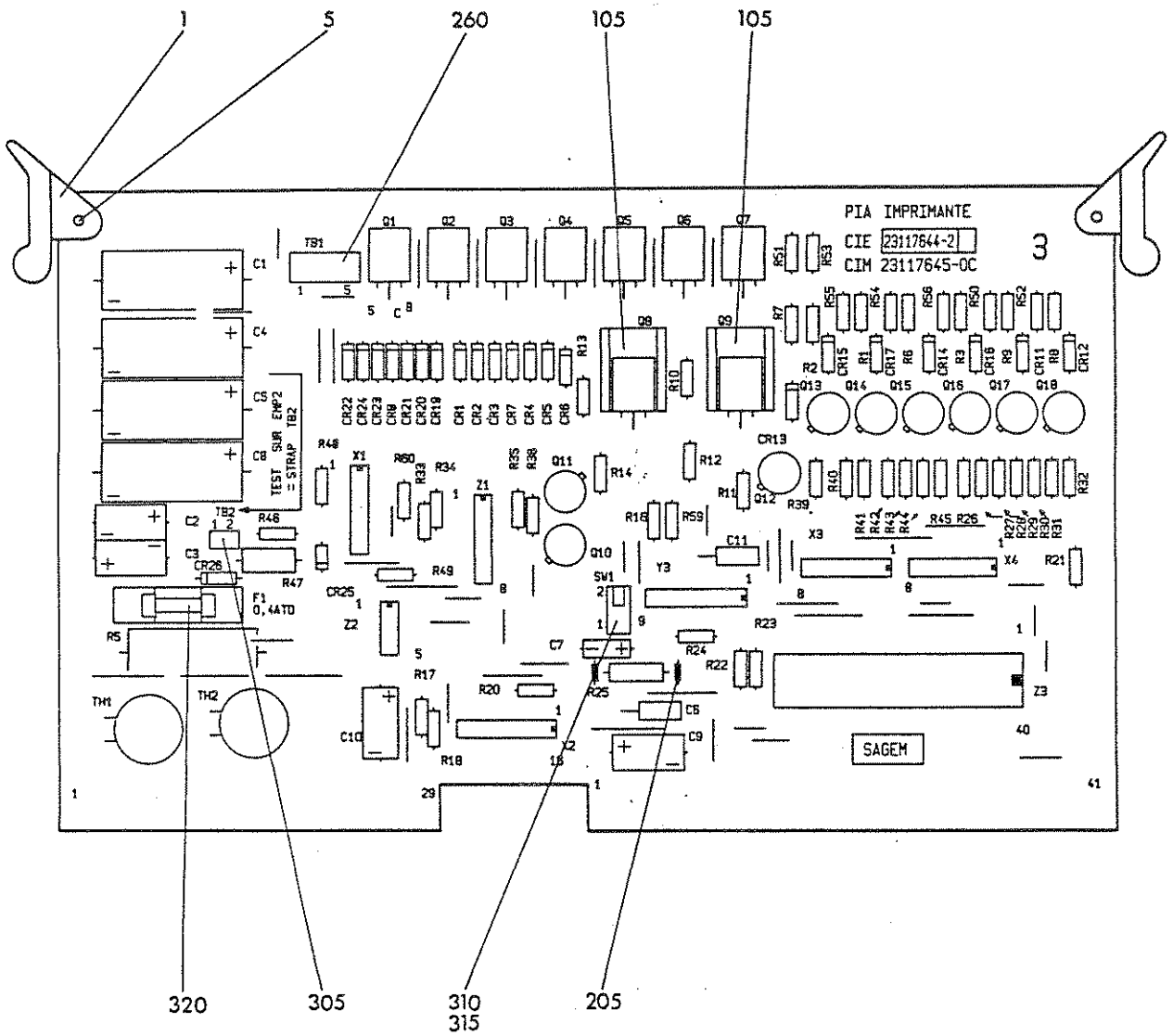


PLATE 178 "PIA IMP" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14018655-2	DIODE ..... CR01 A CR07	BZX87C24	51956	07
15	14018681-2	DIODE CR08	1N4003	10072	01
20	14019002-2	DIODE ..... CR11 A CR17	1N4148	52745	07
25	14018681-2	DIODE ..... CR19 A CR24	1N4003	10072	06
30	14018965-2	DIODE CR25	BAT42	99991	01
35	14018802-7	DIODE CR26	BZX55C22	52745	01
40	14428648-1	CAPACITOR 63V 220MF +50-10% C01	CMFFP63V220M	52169	01
45	14428440-3	CAPACITOR 25V 10MF +100-10% C02-C03	222201516109	51956	02
50	14428648-1	CAPACITOR 63V 220MF +50-10% C04-C05	CMFFP63V220M	52169	02
55	14458203-1	CAPACITOR 16V 22NF +80-20% C06	GFB606-22KJL	51350	01
60	14438321-9	CAPACITOR 40V 0.22MF -10% C07	CTS13-40V220KK	52745	01
65	14428648-1	CAPACITOR 63V 220MF +50-10% C08	CMFFP63V220M	52169	01
70	14428433-8	CAPACITOR 10V 47MF +100-10% C09	222201514479	51956	01
75	14428449-5	CAPACITOR 63V 4.7MF C10	222201590003	51936	01
80	14458203-1	CAPACITOR 16V 22NF +80-20% C11	GFB606-22KJL	51350	01
85	14038362-2	TRANSISTOR ..... Q01 A Q08	B0679	18767	08
90	14038363-5	TRANSISTOR Q09	B0680	18767	01
95	14038854-9	TRANSISTOR Q10	2N2222A	52745	01
100	14039013-5	TRANSISTOR ..... Q11 A Q18	2N2907A	52745	08
105	23118682-8	RADIATOR	23118682-8	53840	02
	15621131-4	SCREW CL M2.5X10	E27116C25Q10CAUP	50035	02
	15700663-4	WASHER A DIAM 2.5	500251-24	57689	02
	15500016-8	NUT H M2.5	E27411A25QQFUL	50035	02
110	14338191-4	RESISTOR 220 OHMS +-5% 1/4W ..... R01 A R03	RC2T220UJ	52745	03
115	14318691-3	RESISTOR 4.7 OHMS +-5% 7W R05	RB57-4U7J	52745	01
120	14338191-4	RESISTOR 220 OHMS +-5% 1/4W ..... R06 A R09	RC2T220UJ	52745	04
125	14338195-6	RESISTOR 470 OHMS +-5% 1/4W R10	RC2T470UJ	52745	01
130	14338199-8	RESISTOR 1 KOHM +-5% 1/4W R11	RC2T1KJ	52745	01
135	14338206-4	RESISTOR 1.8 KOHMS +-5% 1/4W R12	RC2T1K8J	52745	01
140	14338196-9	RESISTOR 560 OHMS +-5% 1/4W R13	RC2T560UJ	52745	01
145	14338212-7	RESISTOR 2.2 KOHMS +-5% 1/4W R14	RC2T2K2J	52745	01
150	14338219-8	RESISTOR 4.7 KOHMS +-5% 1/4W R16	RC2T4K7J	52745	01
155	14338212-7	RESISTOR 2.2 KOHMS +-5% 1/4W R17-R18-R20-R21	RC2T2K2J	52745	04
160	14338219-8	RESISTOR 4.7 KOHMS +-5% 1/4W R22-R23	RC2T4K7J	52745	02
165	14338212-7	RESISTOR 2.2 KOHMS +-5% 1/4W R24	RC2T2K2J	52745	01

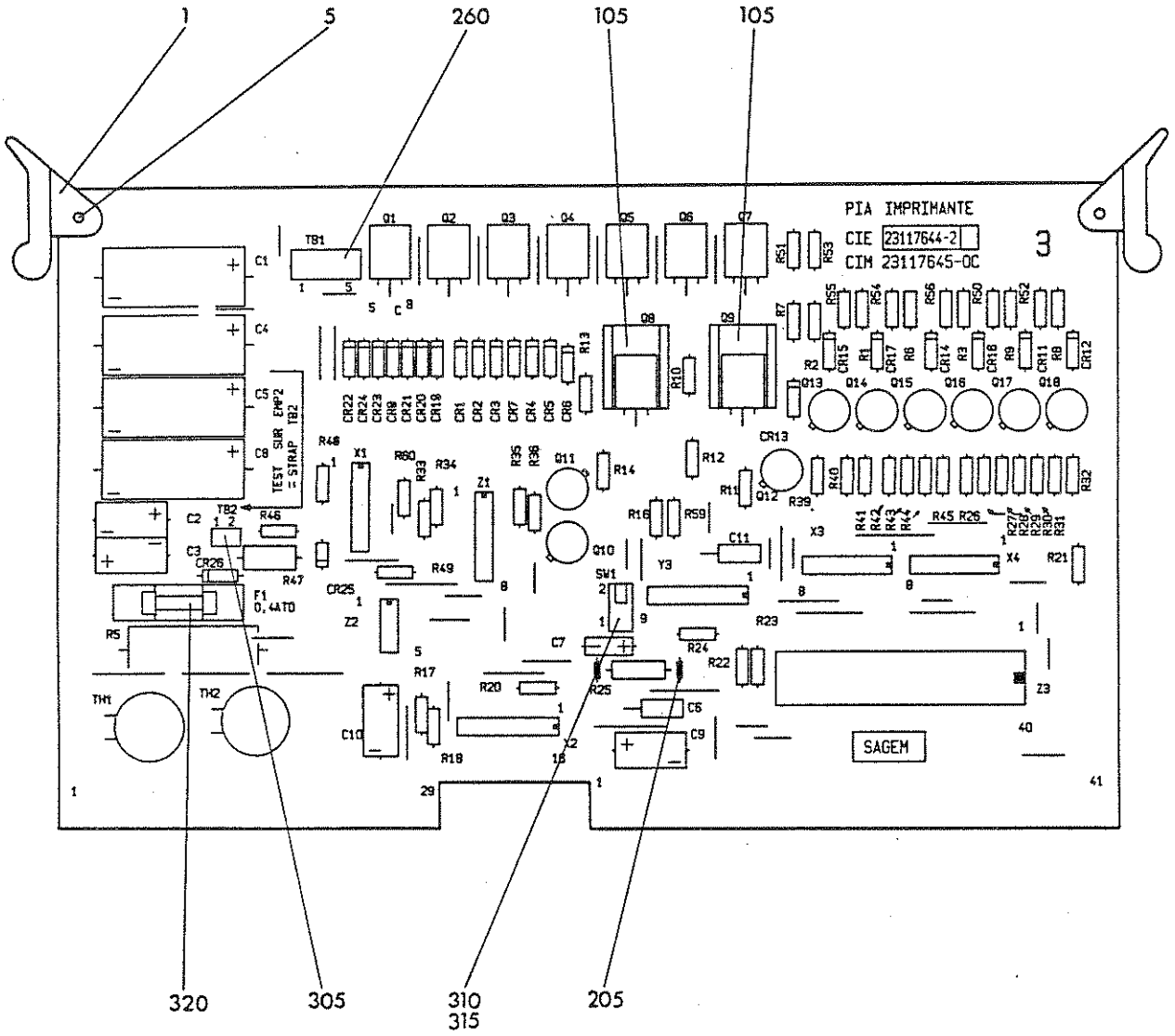


PLATE 17B "PIA IMP" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
170	23081649-8	RESISTOR (TO BE DETERMINED DURING TESTS) R25	23081649-8	53840	01
175	14328364-7	. RESISTOR 8.25 KOHMS +-5% 1/4W	RS63Y8K25F	52745	01
180	14328365-0	. RESISTOR 9.09 KOHMS +-5% 1/4W	RS63Y9K09F	52745	01
185	14329190-4	. RESISTOR 10.2 KOHMS +-5% 1/4W	RS63Y10K2F	52745	01
190	14329191-2	. RESISTOR 11.5 KOHMS +-5% 1/4W	RS63Y11K5F	52745	01
195	14329192-5	. RESISTOR 12.4 KOHMS +-5% 1/4W	RS63Y12K4F	52745	01
200	14329193-3	. RESISTOR 13.7 KOHMS +-5% 1/4W	RS63Y13K7F	52745	01
205	13941918-2	MOUNTING POST	E216P5LP2	53573	02
210	14338195-6	RESISTOR 470 OHMS +-5% 1/4W ..... R26 A R32	RC2T470UJ	52745	07
215	14338219-8	RESISTOR 4.7 KOHMS +-5% 1/4W ..... R33 A R35	RC2T4K7J	52745	03
220	14338212-7	RESISTOR 2.2 KOHMS +-5% 1/4W R36	RC2T2K2J	52745	01
225	14338200-7	RESISTOR 1.2 KOHMS +-5% 1/4W ..... R39 A R45	RC2T1K2J	52745	07
230	14338216-3	RESISTOR 3.3 KOHMS +-5% 1/4W R46	RC2T3K3J	52745	01
235	14338347-6	RESISTOR 2.7 KOHMS +-5% 1/2W R47	RC3T2K7J	52745	01
240	14338222-1	RESISTOR 6.8 KOHMS +-5% 1/4W R48	RC2T6K8J	52745	01
	14338232-5	RESISTOR 39 KOHMS +-5% 1/4W R49	RC2T39KJ	52745	01
245	14338219-8	RESISTOR 4.7 KOHMS +-5% 1/4W ..... R50 A R56	RC2T4K7J	52745	07
250	14338228-4	RESISTOR 18 KOHMS +-5% 1/4W R59	RC2T18KJ	52745	01
255	14338212-7	RESISTOR 2.2 KOHMS +-5% 1/4W R60	RC2T2K2J	52745	01
260	13233840-9	CONNECTOR (5 PIN) TB1	22-05-2051	59191	01
265	14050392-2	INTEGRATED CIRCUIT X01	XR556CP	56876	01
270	14049109-4	INTEGRATED CIRCUIT X02	SN7476N	52367	01
275	14048948-7	INTEGRATED CIRCUIT X03-X04	SN7403N	52367	02
280	14049768-2	INTEGRATED CIRCUIT Y03	DM8602N	18767	01
285	14048948-7	INTEGRATED CIRCUIT Z04	SN7403N	52367	01
290	14058233-2	INTEGRATED CIRCUIT Z02	SFC5451D	99991	01
295	14049752-0	INTEGRATED CIRCUIT Z03	MC6821P	56687	01
300	14340077-2	THERMISTOR TH1-TH2	CTP2322-663-9101	51956	02
305	13948027-7	CONNECTION BAR TB2	5002358	50537	01
310	13948028-0	CONNECTION BAR SW01	5003358	50537	01
315	13948025-6	JUMPER	2001365-08	50537	01
320	23118026-4	CARTRIDGE 0.4 ATD (BLACK) F01	23118026-4	53840	01

ASSEMBLY SUMMARY SHEET

"PIA ERD + IT ADA " BOARD

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Serial	Comments
23074667-0	49	To replace extractors	18				

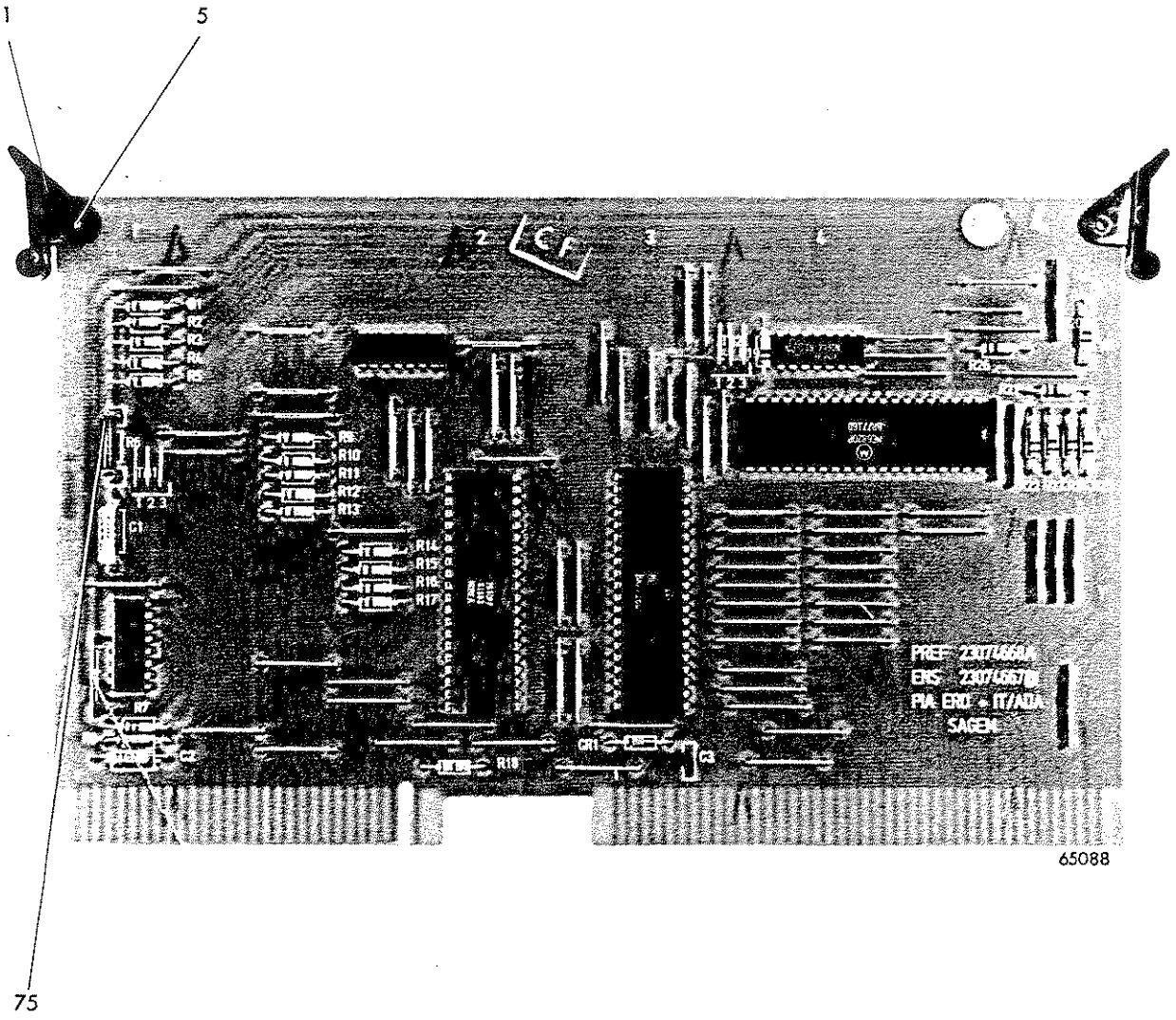


PLATE 18 "PIA ERD + IT/ADA" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14018656-0	DIODE CR01	BZX55C3V3	10072	01
15	14438253-0	CAPACITOR 35V 4.7MF +-10% C01	CTS13-35V4M7K	52745	01
20	14438321-9	CAPACITOR 50V 0.22MF +10% C02	CTS13-50V220KK	52745	01
25	14458203-1	CAPACITOR 16V 22NF +80-20% C03	GFB606-22KJL	51350	01
30	14428433-8	CAPACITOR 10V 47MF +50-10% C04	222201514479	51956	01
35	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W ..... R01 A R05	RC2T10KJ	52745	05
40	23081649-8	RESISTOR (TO BE DETERMINED DURING TESTS) R06	23081649-8	53840	01
45	14328364-7	. RESISTOR 8.25 KOHMS +-1% 1/4W	RS63Y8K25F	52745	01
50	14328365-0	. RESISTOR 9.09 KOHMS +-1% 1/4W	RS63Y9K09F	52745	01
55	14329190-4	. RESISTOR 10.2 KOHMS +-1% 1/4W	RS63Y10K2F	52745	01
60	14329191-2	. RESISTOR 11.5 KOHMS +-1% 1/4W	RS63Y11K5F	52745	01
65	14329192-5	. RESISTOR 12.4 KOHMS +-1% 1/4W	RS63Y12K4F	52745	01
70	14329193-3	. RESISTOR 13.7 KOHMS +-1% 1/4W	RS63Y13K7F	52745	01
75	13941918-2	MOUNTING POST	E216P5LP2	53573	01
80	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R07	RC2T2K2J	52745	01
85	14339114-2	RESISTOR 27 KOHMS +-5% 1/4W R08	RC2T27KJ	52745	01
90	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W ..... R09 A R17	RC2T10KJ	52745	09
95	14339095-0	RESISTOR 1.8 KOHMS +-5% 1/4W R18	RC2T1K8J	52745	01
100	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W ..... R19 A R26	RC2T10KJ	52745	08
105	13233839-7	CONNECTOR (3 PIN) TB01-TB02	22-05-2031	59191	02
110	14049058-4	INTEGRATED CIRCUIT W02	SN7404N	52367	01
115	14049096-4	INTEGRATED CIRCUIT W04	SN7430N	52367	01
120	14049752-0	INTEGRATED CIRCUIT X04	MC6821P	56687	01
125	14049768-2	INTEGRATED CIRCUIT Y01	DM8602N	18767	01
130	14049841-0	INTEGRATED CIRCUIT Y02	S1883	59582	01
135	14049752-0	INTEGRATED CIRCUIT Y03	MC6821P	56687	01

ASSEMBLY SUMMARY SHEET

"PIA LECTEUR + AMPLI" BOARD

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23073206-9	49	To replace extractors	19				
	59	Replacement of transistor Q1 (BD262 or BD678) by (BD680)	19	23073205-1	D	51000	

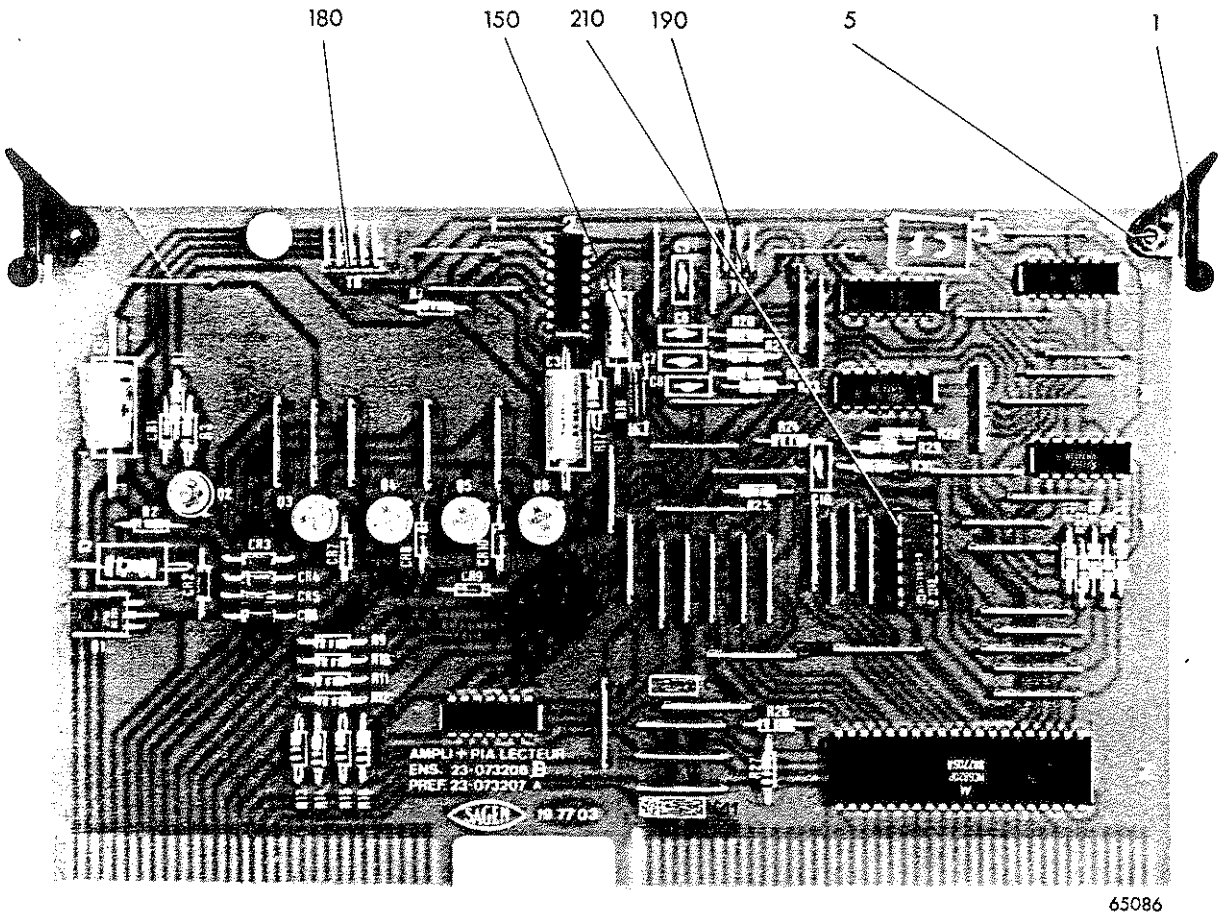


PLATE 19 "PIA LECTEUR + AMPLI" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14019002-2	DIODE CR01	1N4148	52745	01
15	14018681-2	DIODE ..... CR02 A CR06	1N4003	10072	05
20	14019002-2	DIODE ..... CR07 A CR10	1N4148	52745	04
25	14428265-7	CAPACITOR 40V 47MF +50-10% C01	PEG112KE247	57249	01
30	14428440-3	CAPACITOR 25V 10MF +50-10% C02	222201516109	51956	01
35	14438276-2	CAPACITOR 20V 47MF +-10% C03	CTS13-20V47MK	52745	01
40	14438253-0	CAPACITOR 40V 4.7MF +-10% C04	CTS13-40V4M7K	52745	01
45	14458019-4	CAPACITOR 100V 470PF +-10% ..... C05 A C08	222263003471	51956	04
50	14458203-1	CAPACITOR 16V 22NF +80-20% C09	GFB606-22KJL	51350	01
55	14458019-4	CAPACITOR 100V 470PF +-10% C10	222263003471	51956	01
60	14428433-8	CAPACITOR 10V 47MF +50-10% C11	222201514479	51956	01
65	14038363-5	TRANSISTOR Q01	BD680	18767	01
70	14038854-9	TRANSISTOR Q02	2N2222A	52745	01
75	14038853-1	TRANSISTOR ..... Q03 A Q06	2N2919A	52745	04
85	14339109-8	RESISTOR 3.3 KOHMS +-5% 1/4W R01	RC2T3K3J	52745	01
90	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W R02-R03	RC2T10KJ	52745	02
95	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R07	RC2T2K2J	52745	01
100	14339089-8	RESISTOR 100 OHMS +-5% 1/4W ..... R09 A R12	RC2T100UJ	52745	04
105	14339094-7	RESISTOR 1 KOHM +-5% 1/4W ..... R13 A R16	RC2T1KJ	52745	04
110	14339112-1	RESISTOR 15 KOHMS +-5% 1/4W R17	RC2T15KJ	52745	01
115	23081649-8	RESISTOR (TO BE DETERMINED DURING TESTS) R19	23081649-8	53840	01
120	14328364-7	• RESISTOR 8.25 KOHMS +-1% 1/4W	RS63Y8K25F	52745	01
125	14328365-0	• RESISTOR 9.09 KOHMS +-1% 1/4W	RS63Y9K09F	52745	01
130	14329190-4	• RESISTOR 10.2 KOHMS +-1% 1/4W	RS63Y10K2F	52745	01
135	14329191-2	• RESISTOR 11.5 KOHMS +-1% 1/4W	RS63Y11K5F	52745	01
140	14329192-5	• RESISTOR 12.4 KOHMS +-1% 1/4W	RS63Y12K4F	52745	01
145	14329193-3	• RESISTOR 13.7 KOHMS +-1% 1/4W	RS63Y13K7F	52745	01
150	13941918-2	MOUNTING POST	E216P5LP2	53573	02
155	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W ..... R20 A R23	RC2T4K7J	52745	04
160	14339089-8	RESISTOR 100 OHMS +-5% 1/4W R24	RC2T100UJ	52745	01
165	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W R25	C2T4K7J	52745	01
170	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R26-R27	RC2T1KJ	52745	02
175	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W ..... R28 A R35	RC2T4K7J	52745	08
180	13233840-9	CONNECTOR (5 PIN) TB1-5	22-05-2051	59191	01
185	13233839-7	CONNECTOR (3 PIN) TB6-8	22-05-2031	59191	01

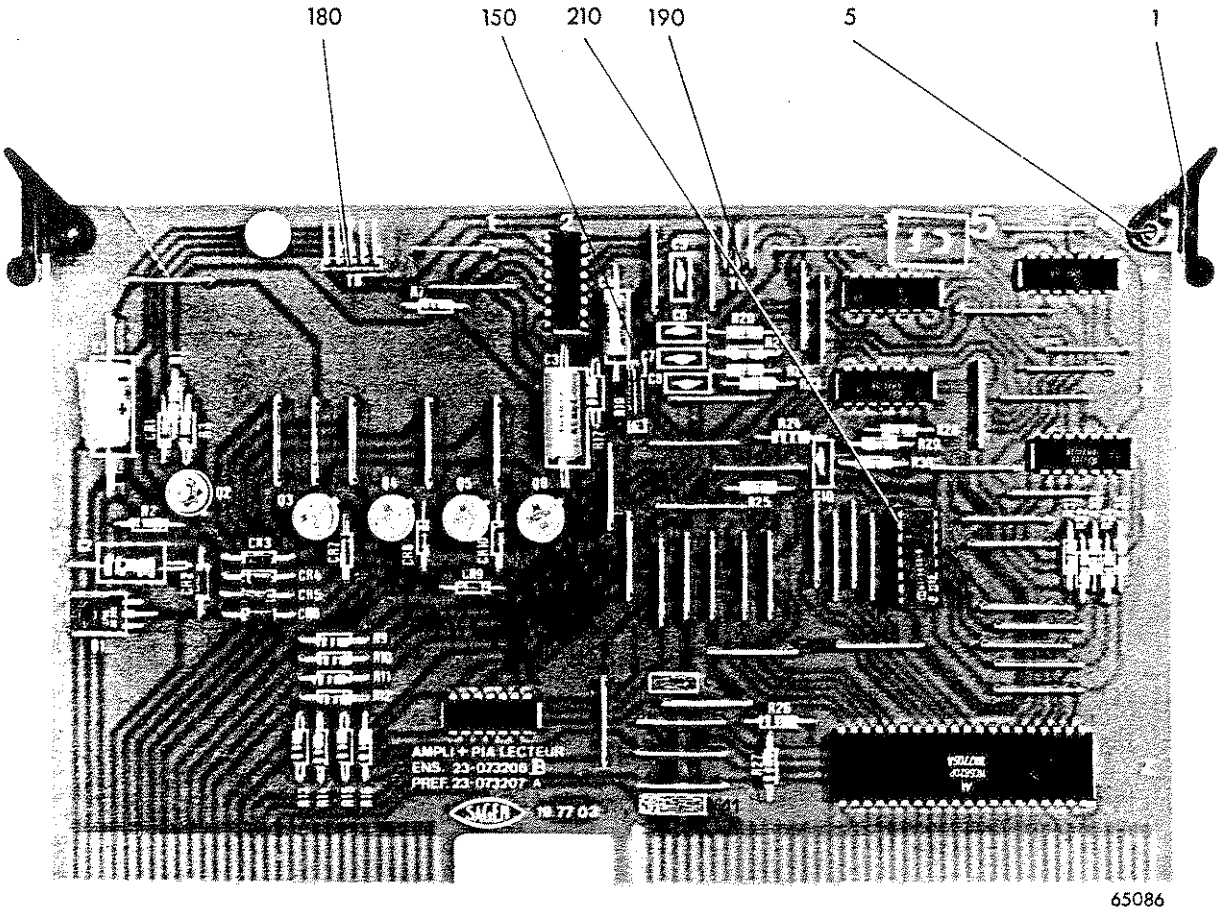


PLATE 19 "PIA LECTEUR + AMPLI" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
190	14049768-2	INTEGRATED CIRCUIT W02	DM8602N	18767	01
195	14048947-9	INTEGRATED CIRCUIT W03-W04	SN7400N	52367	02
200	14048948-7	INTEGRATED CIRCUIT X03	SN7403N	52367	01
205	**********	INTEGRATED CIRCUIT (SEE PL.00 ITEM 73) Y03	**********		PM
210	14099027-9	DIL SOCKET 16 PIN	C93-16-02	52367	01
215	14048948-7	INTEGRATED CIRCUIT Y04	SN7403N	52367	01
220	14049058-4	INTEGRATED CIRCUIT Z01	SN7404N	52367	01
225	14049752-0	INTEGRATED CIRCUIT Z03	MC6821P	56687	01

ASSEMBLY SUMMARY SHEET
"PIA CLAVIER + MPU" BOARD

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sërial	Comments
23077489-3	49	To replace extractors	20 A				
	9	Putting into strap and suppression of a resistor (R2)	20 A	23077488-5	E		
23106892	37 bis	New board	20 C	23106927-5	B		

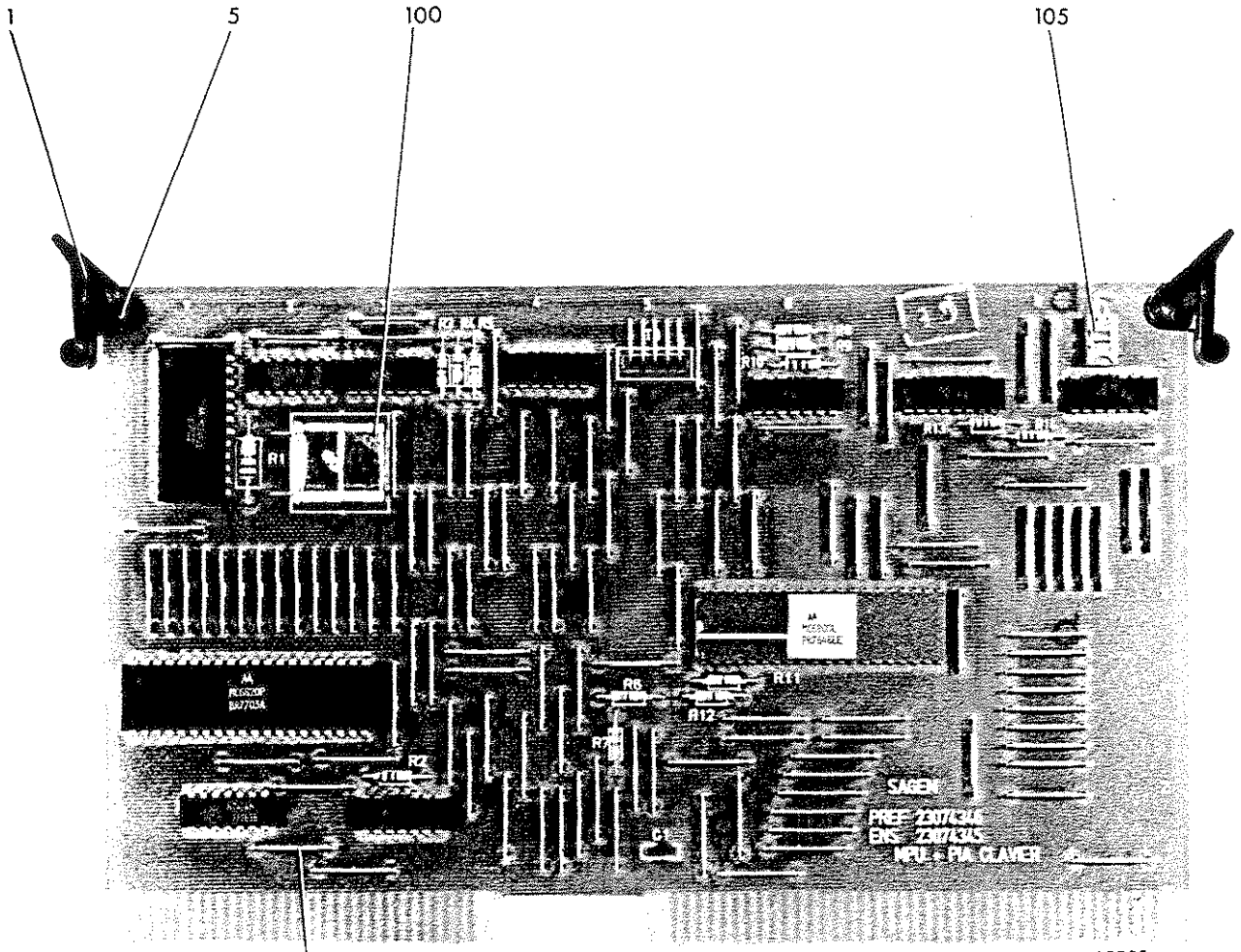


PLATE 20A "PIA CLAVIER + MPU" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14338184-9	RESISTOR 10 MOHMS +-5% 1/4W R01	CR37B10M	51956	01
15	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R02	RC2T1KJ	52745	01
20	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W ..... R03 A R06	RC2T4K7J	52745	04
25	14339109-8	RESISTOR 3.3 KOHMS +-5% 1/4W R07	RC2T3K3J	52745	01
30	14339127-5	RESISTOR 470 OHMS +-5% 1/4W R08-R09	RC2T470UJ	52745	02
35	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R10	RC2T1KJ	52745	02
40	14339109-8	RESISTOR 3.3 KOHMS +-5% 1/4W R11-R12	RC2T3K3J	52745	02
45	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R13-R14	RC2T2K2J	52745	02
50	14458203-1	CAPACITOR 16V 22NF +80-20% C01	GFB606-22KJL	51350	01
55	14049162-2	INTEGRATED CIRCUIT V02	SN74L04N	52367	01
60	14049062-0	INTEGRATED CIRCUIT V03	SN7401N	52367	01
65	14049058-4	INTEGRATED CIRCUIT V04-V06	SN7404N	52367	02
70	14049109-4	INTEGRATED CIRCUIT V07	SN7476N	52367	01
75	14048947-9	INTEGRATED CIRCUIT V08	SN7400N	52367	01
80	14049842-8	INTEGRATED CIRCUIT W01	MC14411P	56687	01
85	14049839-5	INTEGRATED CIRCUIT X05	MC6800P	56687	01
90	14049838-7	INTEGRATED CIRCUIT Y02	MC6820L	56687	01
95	14049058-4	INTEGRATED CIRCUIT Z01-Z03	SN7404N	52367	02
100	14218004-5	QUARTZ CRISTAL 1.8432 MHZ W02	QA19A18432K2	52745	01
105	13211888-6	SWITCH	090620105	52116	01
110	13942135-6	LINK	E219P5LP2	53573	SB
120	13233840-9	CONNECTOR (5 PIN) ..... TB	22-05-2051	59191	01

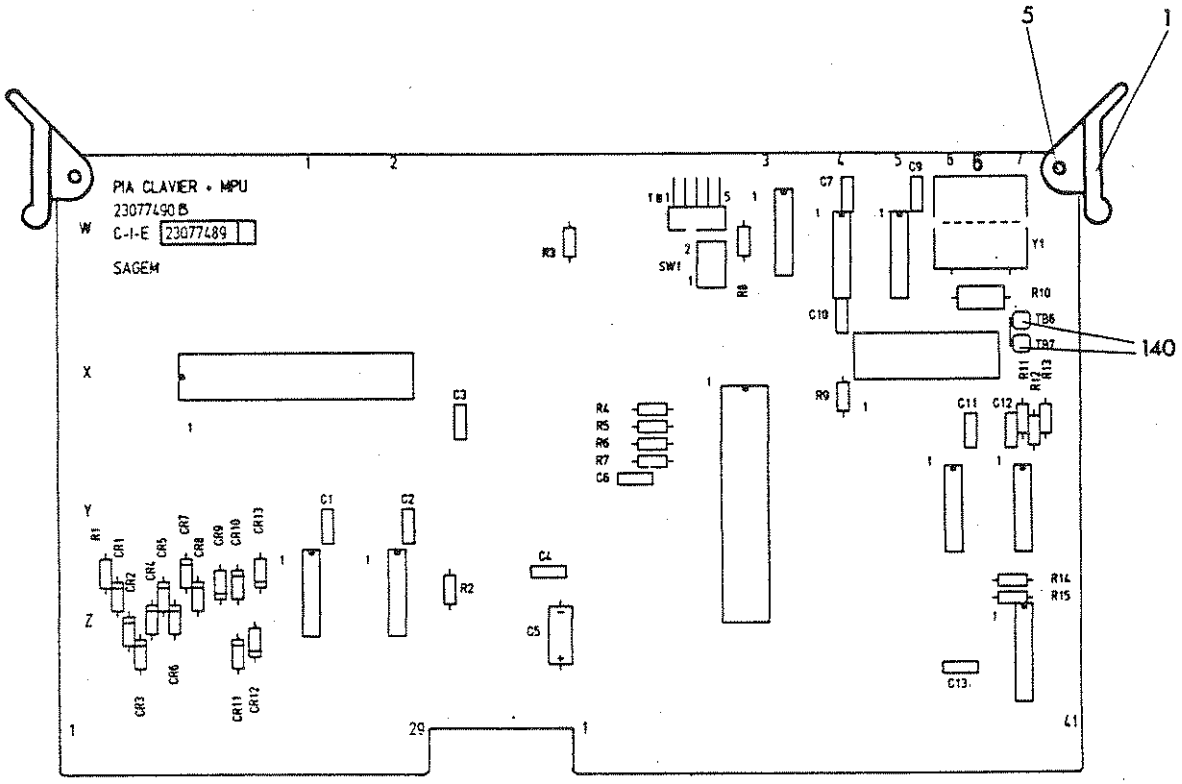


PLATE 20B "PIA CLAVIER + MPU" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1 5	23082278-0 15850742-4	EXTRACTOR ..... PIN SPIRAL HDK 3/32X1/4 STEEL	23082278-0 15850742-4	53840 53840	02 02
10	14019002-2	DIODE ..... CR01 A CR13	1N4148	52745	13
15	14451226-1	CAPACITOR 63V 0.1MF +-20% ..... C01 A C04	3C1F63R104M	53072	04
20	14428433-8	CAPACITOR 10V 47MF +50-10% C05	222201514479	51956	01
25	14451226-1	CAPACITOR 63V 0.1MF +-20% C06-C07	3C1F63R104M	53072	02
30	14451226-1	CAPACITOR 63V 0.1MF +-20% ..... C09 A C13	3C1F63R104M	53072	05
35	14338205-2	RESISTOR 22 OHMS +-5% 1/4W R01	RC2T22UJ	52745	01
40	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R03	RC2T1KJ	52745	01
45	14339127-5	RESISTOR 470 OHMS +-5% 1/4W R04	RC2T470UJ	52745	01
50	14339109-8	RESISTOR 3.3 KOHMS +-5% 1/4W ..... R05 A R07	RC2T3K3J	52745	03
55	14339127-5	RESISTOR 470 OHMS +-5% 1/4W R08-R09	RC2T470UJ	52745	02
60	14338184-9	RESISTOR 10 MOHMS +-5% 1/2W R10	CR37B10M	51956	01
65	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W ..... R11 A R14	RC2T4K7J	52745	04
70	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R15	RC2T2K2J	52745	01
75	13211888-6	SWITCH SW01	090620105	52116	01
80	13233840-9	CONNECTOR (5 PIN) TB1-5	22-05-2051	59191	01
85	14049302-7	INTEGRATED CIRCUIT W03	SN74S04N	52367	01
90	14049351-9	INTEGRATED CIRCUIT W04	SN74LS00N	52367	01
95	14049162-2	INTEGRATED CIRCUIT W05	SN74L04N	52367	01
100	14218004-5	QUARTZ CRISTAL 1.8432 MHZ W06	QA19A18432K2	52745	01
105	14049752-0	INTEGRATED CIRCUIT X01	MC6821P	56687	01
110	14049842-8	INTEGRATED CIRCUIT X05	MC14411P	56687	01
115	14049839-5	INTEGRATED CIRCUIT Y03	MC6800P	56687	01
120	14049162-2	INTEGRATED CIRCUIT Y06	SN74L04N	52367	01
125	14049062-0	INTEGRATED CIRCUIT Y07	SN7401N	52367	01
130	14049058-4	INTEGRATED CIRCUIT Z01-Z02	SN7404N	52367	02
135	14049109-4	INTEGRATED CIRCUIT Z07	SN7476N	52367	01
140	13941640-9	LUG	E215-5	53573	02

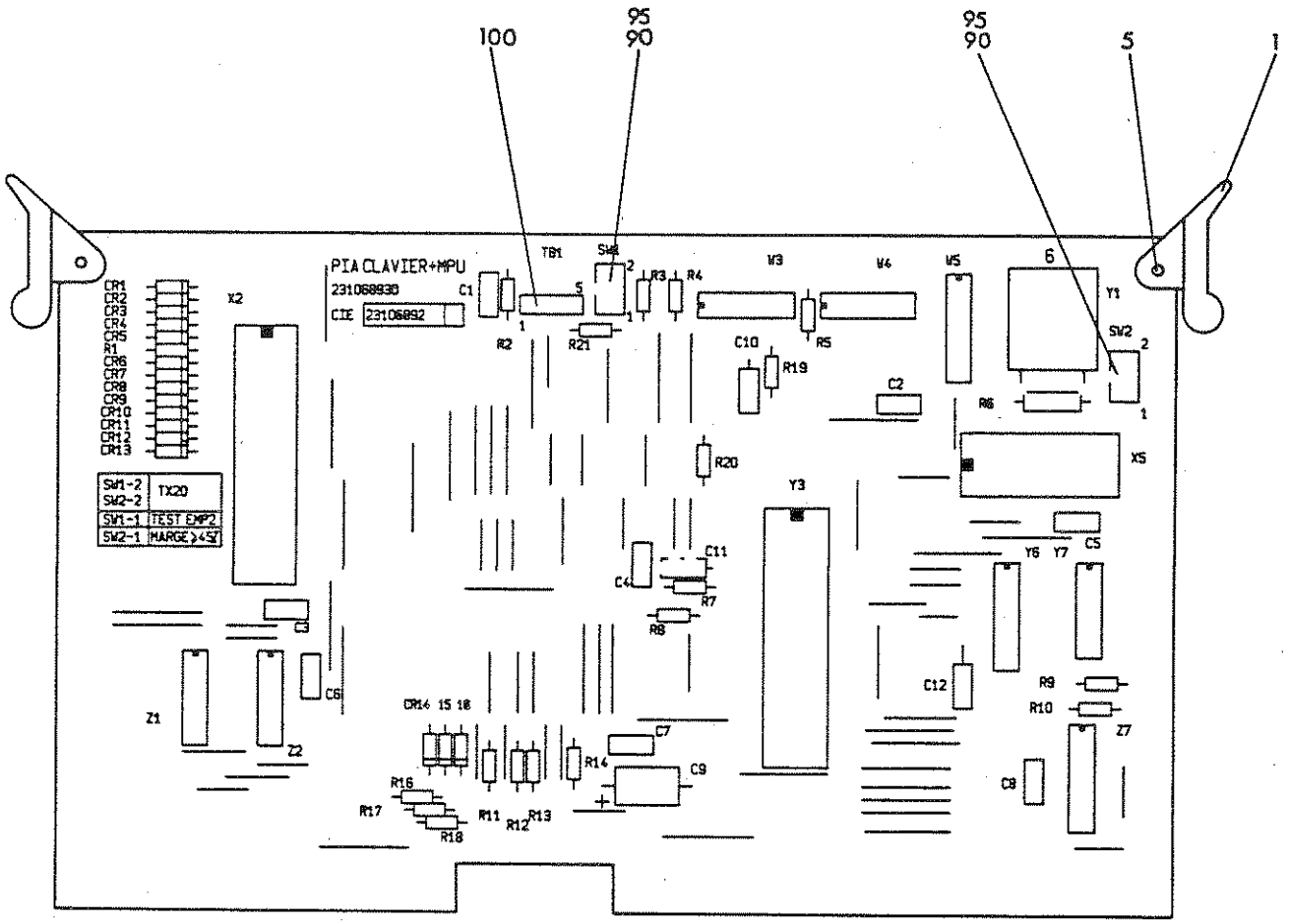


PLATE 20C "PIA CLAVIER + MPU" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14019002-2	DIODE ..... CR01 A CR13	1N4148	52745	13
15	14018659-4	DIODE ..... CR14 A CR16	BZX55C5V6	52745	03
20	14458282-5	CAPACITOR 63V 0.1MF +-20% ..... C01 A C08	CN73-63V100KM	52745	08
25	14428433-8	CAPACITOR 10V 47MF +-20% C09	222201514479	51956	01
30	14458013-1	CAPACITOR 63V 47PF +-10% ..... C10 A C12	222263810479	51956	03
35	14338205-2	RESISTOR 22 OHMS +-5% 1/4W R01	RC2T22UJ	52745	01
40	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R02	RC2T1KJ	52745	01
45	14339127-5	RESISTOR 470 OHMS +-5% 1/4W ..... R03 A R05	RC2T470UJ	52745	03
50	14338184-9	RESISTOR 10 MOHMS +-5% 1/2W R06	CR37810M	51956	01
55	14339109-8	RESISTOR 3.3 KOHMS +-5% 1/4W R07-R08	RC2T3K3J	52745	02
60	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W R09	RC2T4K7J	52745	01
65	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R10	RC2T2K2J	52745	01
70	14339096-8	RESISTOR 4.7 KOHMS +-5% 1/4W ..... R11 A R13	RC2T4K7J	52745	03
75	14339109-8	RESISTOR 3.3 KOHMS +-5% 1/4W R14	RC2T3K3J	52745	01
80	14338193-5	RESISTOR 33 OHMS +-5% 1/4W ..... R16 A R18	RC2T33UJ	52745	03
85	14338096-2	RESISTOR 33 OHMS +-5% 1/4W ..... R19 A R21	RC2T33UJ	52745	03
90	13948028-0	CONNECTION BAR SW01-SW02	5003358	50537	02
95	13948025-6	JUMPER	2001365-08	50537	02
100	13233840-9	CONNECTOR (5 PIN) TB1	22-05-2051	59191	01
105	14049058-4	INTEGRATED CIRCUIT W03	SN7404N	52367	01
110	14049351-9	INTEGRATED CIRCUIT W04	SN74LS00N	52367	01
115	14049852-2	INTEGRATED CIRCUIT W05	MC14049BCP	56687	01
120	14049752-0	INTEGRATED CIRCUIT X02	MC6821P	56687	01
125	14049842-8	INTEGRATED CIRCUIT X05	MC14411P	56687	01
130	14049839-5	INTEGRATED CIRCUIT Y03	MC6800P	56687	01
135	14049852-2	INTEGRATED CIRCUIT Y06	MC14049BCP	56687	01
140	14049062-0	INTEGRATED CIRCUIT Y07	SN7401N	52367	01
145	14049058-4	INTEGRATED CIRCUIT Z01-Z02	SN7404N	52367	02
150	14049109-4	INTEGRATED CIRCUIT Z07	SN7476N	52367	01
155	14218004-5	QUARTZ CRISTAL 1.8432 MHZ Y01	QA1918432K2	52745	01

ASSEMBLY SUMMARY SHEET
"RAM + RPROM" BOARD

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23074438-7	49	To replace extractors	21 A				
	11	To add a diode on output of the regulator circuit 78M12C "MOTOROLA"	21 A	23074445-2	C	42500	
23101491-5	46	New board	21 B	23101490-2	C		
23118714-3	77	New board with RPROM 2716 or 2732	21 C	23118718-5	A		

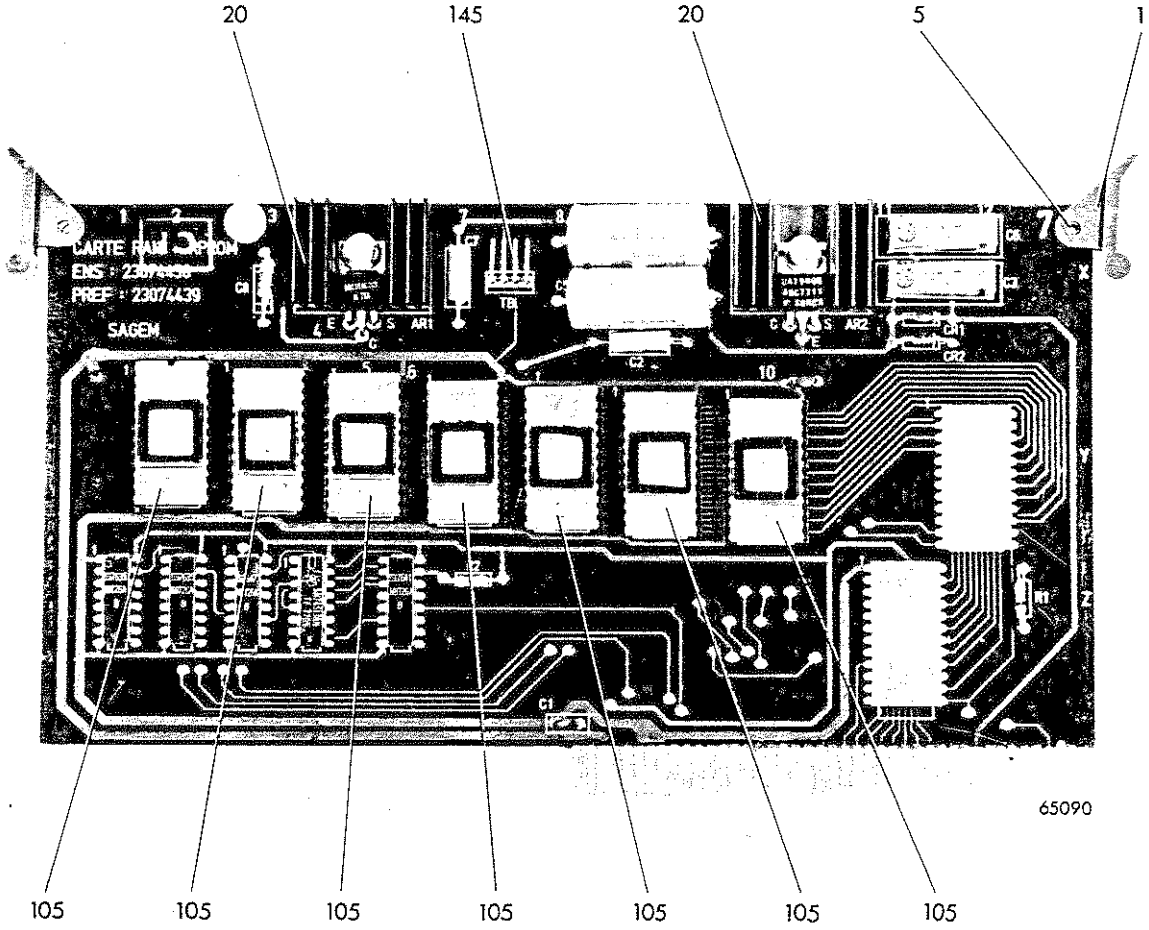


PLATE 21A "RAM + RPROM" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14058189-8	INTEGRATED CIRCUIT AR1	78M12C	59705	01
15	14058078-9	INTEGRATED CIRCUIT AR2	79M05C	52367	01
20	23109547-3	MACHINED RADIATOR	23109547-3	53840	02
	15621137-7	SCREW CL M3X10	E27116C30Q10CAUP	50035	02
	15700378-7	UNDULATING WASHER B3	520301-24	51689	02
	15500019-7	NUT H M3	E27411A30QQFUL	50035	02
25	14018681-2	DIODE CR01	1N4003	10072	01
30	14018681-2	DIODE CR02	1N4003	10072	01
31	14011659-7	DIODE CR03	BAT42	99991	01
35	14458203-1	CAPACITOR 16V 22NF +80-20% C01	GFB606-22KJL	51350	01
40	14438252-2	CAPACITOR 40V 10MF +-10% C02	CTS13-40V10MK	52745	01
45	14448440-9	CAPACITOR 250V 0.47MF +-10% C03	222235245474	51956	01
50	14428267-8	CAPACITOR 16V 470MF +-10% C04	PEG112GM347	57249	01
55	14428267-8	CAPACITOR 16V 470MF +-10% C05	PEG112GM347	57249	01
60	14448440-9	CAPACITOR 250V 0.47MF +10% C06	222235245474	51956	01
65	14438252-2	CAPACITOR 40V 10MF +-10% C07	CTS13-40V10MK	52745	01
70	14438278-3	CAPACITOR 40V 1MF +-10% C08	CTS13-40V1MK	52745	01
75	14458203-1	CAPACITOR 16V 22NF +80-20% C09	GFB606-22KJL	51350	01
80	14458203-1	CAPACITOR 16V 22NF +80-20% C10	GFB606-22KJL	51350	01
85	14428433-8	CAPACITOR 10V 47MF -10+50% C11	222201514479	51956	01
90	14458203-1	CAPACITOR 16V 22NF +80-20% C12	GFB606-22KJL	51350	01
95	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R1	RC2T1KJ	52745	01
100	14339109-8	RESISTOR 3.3 KOHMS +-5% 1/4W R2	RC2T3K3J	52745	01
105	14099029-0	DIL SOCKET 24 PIN Y2-Y3-Y5-Y7-Y8-Y9-Y10	640361-1	50075	07
110	14049836-6	INTEGRATED CIRCUIT Y12	MCM6810AP	56687	01
115	14058200-1	INTEGRATED CIRCUIT Z1	MC8T26AP	56687	01
120	14058200-1	INTEGRATED CIRCUIT Z2	MC8T26AP	56687	01
125	14058200-1	INTEGRATED CIRCUIT Z3	MC8T26AP	56687	01
130	14049648-7	INTEGRATED CIRCUIT Z4	SN74S138N	52367	01
135	14058200-1	INTEGRATED CIRCUIT Z6	MC8T26AP	56687	01
140	14049836-6	INTEGRATED CIRCUIT Z11	MCM6810AP	56687	01
145	13233210-5	CONNECTOR (4 PIN)	22-05-2041	59191	01

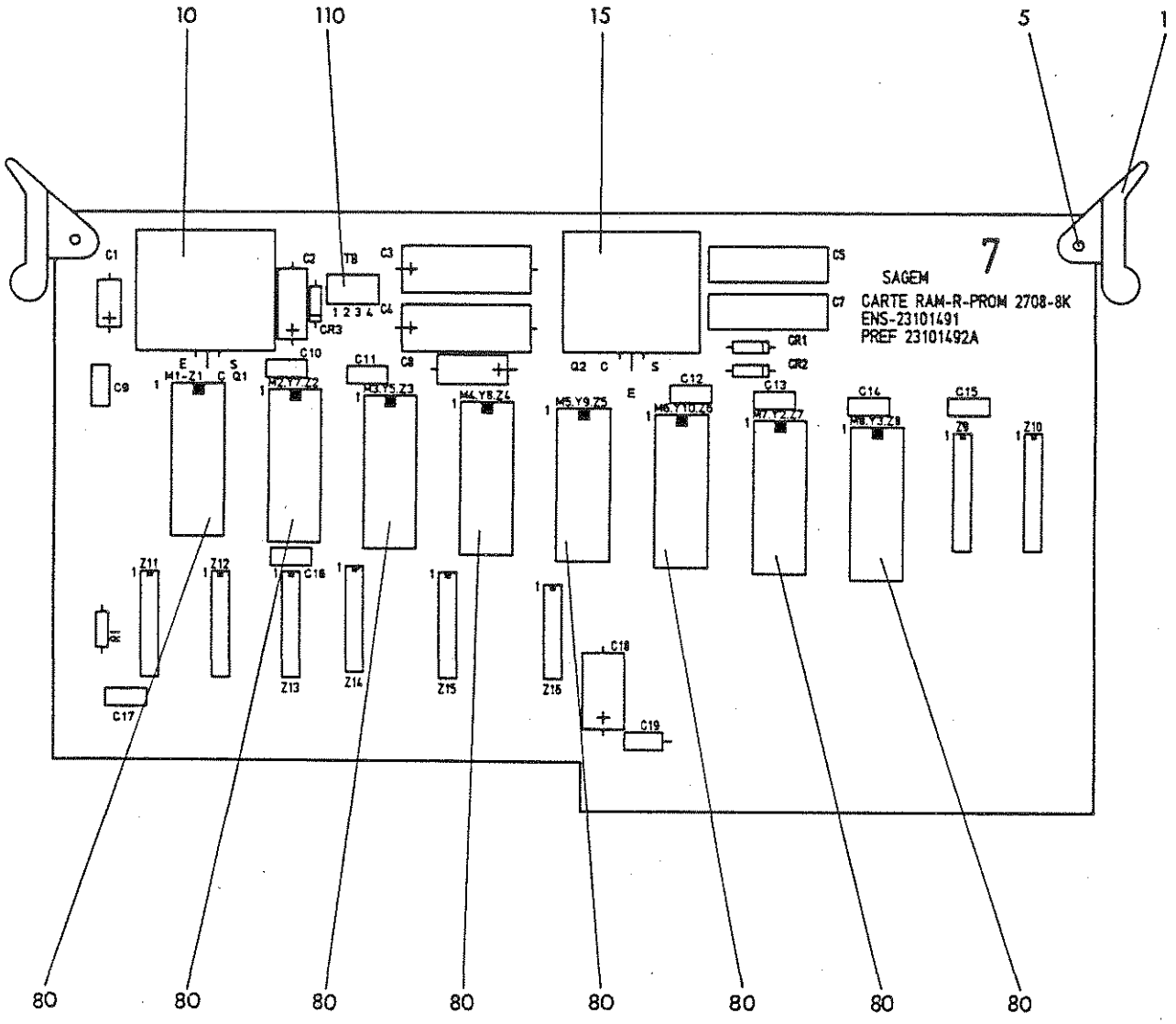


PLATE 218 "RAM + RPROM" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14058189-8	INTEGRATED CIRCUIT Q01	78M12C	59705	01
15	14058078-9	INTEGRATED CIRCUIT Q02	79M05C	52367	01
20	23109547-3	MACHINED RADIATOR	23109547-3	53840	02
	15621137-7	SCREW CL M3X10 INOX	E27116C30Q10CAUP	50035	02
	15700257-4	WASHER M3U	E27611M30AAUL	50035	02
	15500019-7	NUT H M3	E27411A30QQFUL	50035	02
25	14018681-2	DIODE CR01-CR02	1N4003	10072	02
30	14011659-7	DIODE CR03	BAT42	99991	01
35	14438278-3	CAPACITOR 35V 1MF +-10% C01	CTS1335V10MK	52745	01
40	14438252-2	CAPACITOR 25V 10MF +-10% C02	CTS13-40V10MK	52745	01
45	14428267-8	CAPACITOR 16V 470MF +-10% C03-C04	PEG112GM347	57249	02
50	14448440-9	CAPACITOR 250V 0.47MF +-10% C05-C07	222235245474	51956	02
55	14438252-2	CAPACITOR 250V 10MF C08	CTS13-40V10MK	52745	01
60	14458282-5	CAPACITOR 63V 0.1MF +-20%	CN73-63VU1M	52745	09
65	14428434-6	CAPACITOR 10V 100MF +50-10% C18	222201614101	51956	01
70	14458203-1	CAPACITOR 16V 22NF +80-20% C19	GFB606-22KJL	51350	01
75	14339109-8	RESISTOR 3.3 KOHMS +-5% 0.25W R01	RC2T3K3J	52745	01
80	14099029-0	DIL SOCKET 24 PIN Z01 A Z08	640361-1	50075	08
85	14048171-2	INTEGRATED CIRCUIT Z09-Z10	MM2114N3L	18767	02
90	14058200-1	INTEGRATED CIRCUIT Z11-Z12-Z13	MC8T26AP	56687	03
95	14049367-1	INTEGRATED CIRCUIT Z14	SN74LS138N	52367	01
100	14058200-1	INTEGRATED CIRCUIT Z15	MC8T26AP	56687	01
105	14049355-1	INTEGRATED CIRCUIT Z16	SN74LS10N	52367	01
110	13233210-5	CONNECTOR (4 PIN)	22-05-2041	59191	01

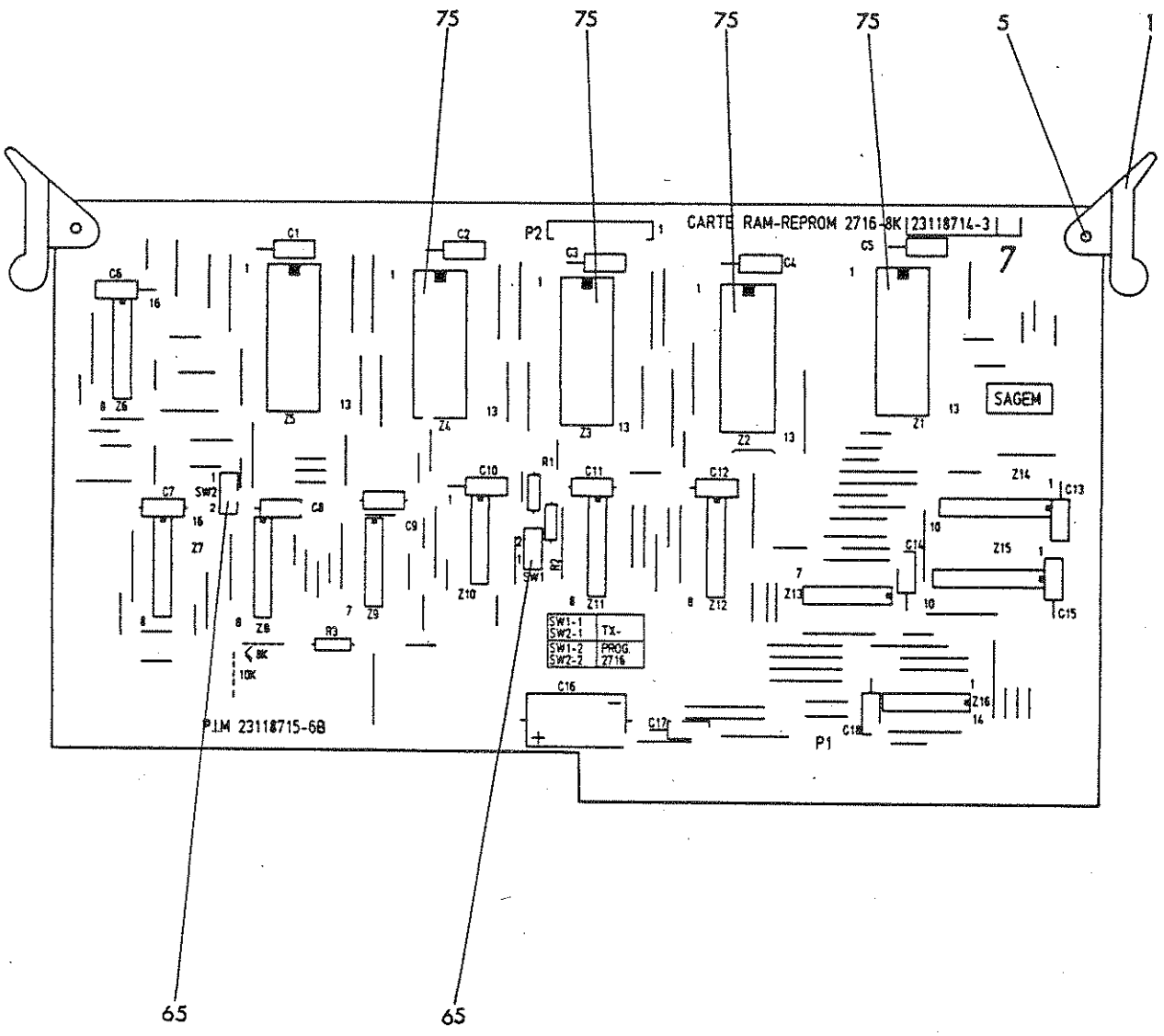


PLATE 21C "RAM + RPROM" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14458203-1	CAPACITOR 16V 22NF +80-20% ..... C01 A C05	GFB606-22KJL	51350	05
15	14458282-5	CAPACITOR 63V 0.1MF 20% ..... C06 A C08	CN73-63VU1M	52745	03
20	14458203-1	CAPACITOR 16V 22NF +80-20% ..... C09 A C11	GFB606-22KJL	51350	03
25	14458282-5	CAPACITOR 63V 0.1MF 20% C12	CN73-63VU1M	52745	01
30	14458203-1	CAPACITOR 16V 22NF +80-20% C13	GFB606-22KJL	51350	01
35	14458282-5	CAPACITOR 63V 0.1MF 20% C14	CN73-63VU1M	52745	01
40	14458203-1	CAPACITOR 16V 22NF +80-20% C15	GFB606-22KJL	51350	01
45	14428434-6	CAPACITOR 10V 100MF -10+50% C16	222201614101	51956	01
50	14458203-1	CAPACITOR 16V 22NF +80-20% C17	GFB606-22KJL	51350	01
55	14458282-5	CAPACITOR 63V 0.1MF 20% C18	CN73-63VU1M	52745	01
60	14338225-0	RESISTOR 10 KOHMS +-5% 1/4W ..... R01 A R03	RC2T10KJ	52745	03
65	13948028-0	CONNECTION BAR SW01-SW02	5003358	50537	02
70	13948025-6	JUMPER	2001365-08	50537	02
75	14099029-0	DIL SOCKET 24 PIN ..... Z01 A Z04	640361-1	50075	04
80	14049517-0	INTEGRATED CIRCUIT Z06-Z07	SFC74LS365AE	99991	02
85	14049518-8	INTEGRATED CIRCUIT Z08	SFC74LS366AE	99991	01
90	14049352-2	INTEGRATED CIRCUIT Z09	SN74LS04N	52367	01
95	14049093-5	INTEGRATED CIRCUIT Z10	SN7410N	52367	01
100	14049367-1	INTEGRATED CIRCUIT Z11	SFC74LS3138E	99991	01
105	14049517-0	INTEGRATED CIRCUIT Z12	SFC74LS365AE	99991	01
110	14049896-5	INTEGRATED CIRCUIT Z13	SN74LS243N	52367	01
115	14048171-2	INTEGRATED CIRCUIT Z14-Z15	MM2114N3L	18767	02
120	14049896-5	INTEGRATED CIRCUIT Z16	SN74LS243N	52367	01

ASSEMBLY SUMMARY SHEET

"PIA PERFO + AMPLI" BOARD

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23073040-3	49	To replace extractors	-				
	51	To replace Q2 to Q6 by BD679, Q1 by BD680, CR19 by B2 V47 C3 V9, Y3 by 7406 Replacement of the R19 1,8 Kohm by a 560 Ohms	-	23073039-1	G		
	70	Replacement of the R4 10 Kohms by a 1,8 kohm	22 A	23073039-1	H		
23119272-7	82	New board	22 B	23119278-0	-		

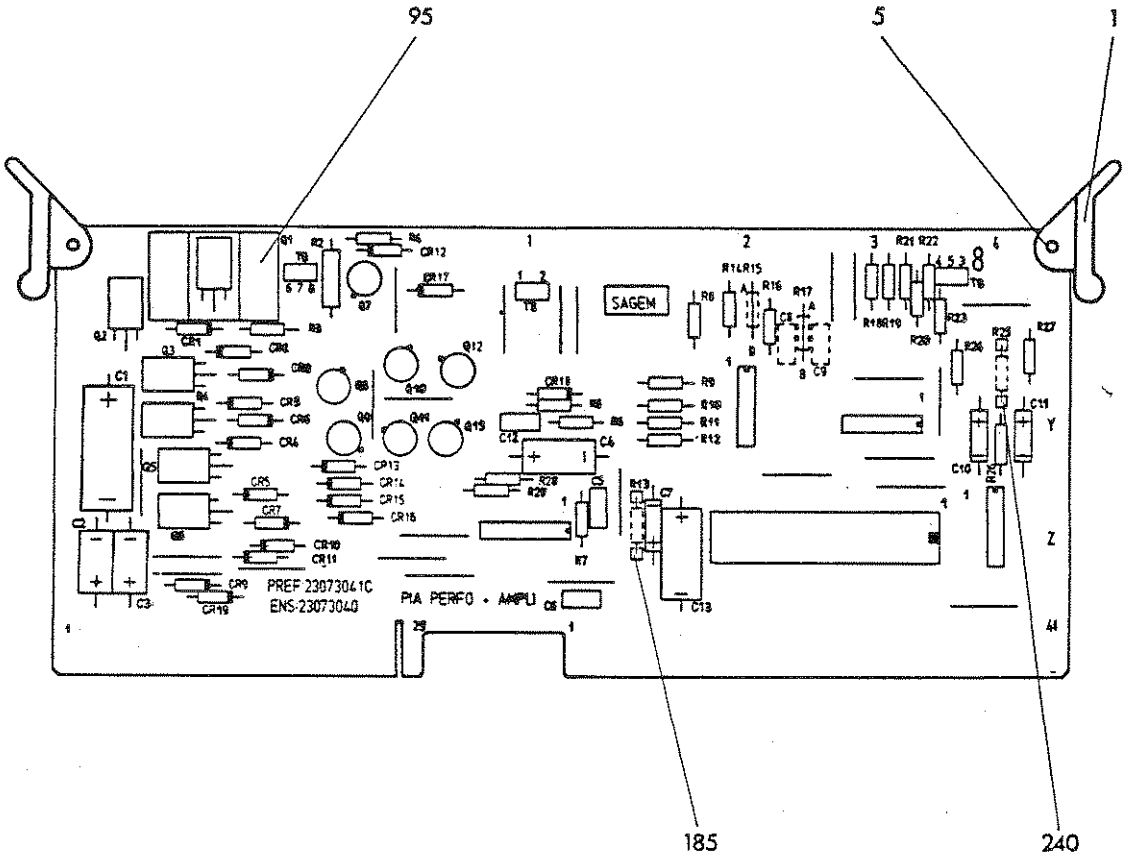


PLATE 22A "PIA PERFO + AMPLI" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14018681-2	DIODE CR01	1N4003	10072	01
15	14019002-2	DIODE ..... CR02 A CR05	1N4148	52745	04
20	14018681-2	DIODE ..... CR06 A CR11	1N4003	10072	06
25	14019002-2	DIODE CR12	1N4148	52745	01
30	14018681-2	DIODE ..... CR13 A CR16	1N4003	10072	04
35	14019002-2	DIODE CR17-CR18	1N4148	52745	02
40	14011703-1	DIODE CR19	BZV47C3V9	52183	01
45	14428265-7	CAPACITOR 40V 47MF +50-10% C01	PEG112KE247	57249	01
50	14428440-3	CAPACITOR 25V 10MF +50-10% C02-C03	222201516109	51956	02
55	14428432-5	CAPACITOR 10V 22MF +50-10% C04	222201514229	51956	02
60	14458203-1	CAPACITOR 16V 22NF +80-20% C05-C06	GFB606-22KJL	51350	02
65	14438278-3	CAPACITOR 40V 1MF +-10% C07	CTS13-40V1MK	52745	01
70	14438281-6	CAPACITOR 20V 2.2MF +-10% C10	CTS13-20V2M2K	52745	01
75	14438277-5	CAPACITOR 40V 0.1MF +-10% C11	CTS13-40V100KK	52745	01
80	14458019-4	CAPACITOR 100V 470PF +-10% C12	222263003471	51956	01
85	14438266-8	CAPACITOR 20V 47MF +-20% C13	CTS13-20V47MM	52745	01
90	14038363-5	TRANSISTOR Q01	BD680	18767	01
	15621067-2	SCREW CL M2.5X10	E27116C25Q10QEUL	50035	01
	15700241-2	WASHER B DIAM 2.5	520251-24	51689	01
	15500016-8	NUT H M2.5	E27411A25QQFUL	50035	01
95	23075850-0	RADIATOR	23075850-0	53840	01
100	14038362-2	TRANSISTOR ..... Q02 A Q06	BD679	18767	05
105	14038854-9	TRANSISTOR Q07	2N2222A	52745	01
110	14038853-1	TRANSISTOR ..... Q08 A Q13	2N2919A	52745	06
120	14339012-4	RESISTOR 4.7 KOHMS +-5% 1/2W R02	RC3T4K7J	52745	01
125	14339104-3	RESISTOR 220 OHMS +-5% 1/4W R03	RC2T220UJ	52745	01
126	14339095-0	RESISTOR 1.8 KOHMS +-5% 1/4W R04	RC2T1K8J	52745	01
130	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W R05	RC2T10KJ	52745	01
135	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R06	RC2T2K2J	52745	01
140	14339112-1	RESISTOR 15 KOHMS +-5% 1/4W R07	RC2T15KJ	52745	01
145	14339095-0	RESISTOR 1.8 KOHMS +-5% 1/4W ..... R08 A R12	RC2T1K8J	52745	05
150	23081649-8	RESISTOR (TO BE DETERMINED DURING TESTS) R13	23081649-8	53840	01
155	14328364-7	• RESISTOR 8.25 KOHMS +-1% 1/4W	RS63Y8K25F	52745	01
160	14328365-0	• RESISTOR 9.09 KOHMS +-1% 1/4W	RS63Y9K09F	52745	01
165	14329190-4	• RESISTOR 10.2 KOHMS +-1% 1/4W	RS63Y10K2F	52745	01
170	14329191-2	• RESISTOR 11.5 KOHMS +-1% 1/4W	RS63Y11K5F	52745	01
175	14329192-5	• RESISTOR 12.4 KOHMS +-1% 1/4W	RS63Y12K4F	52745	01

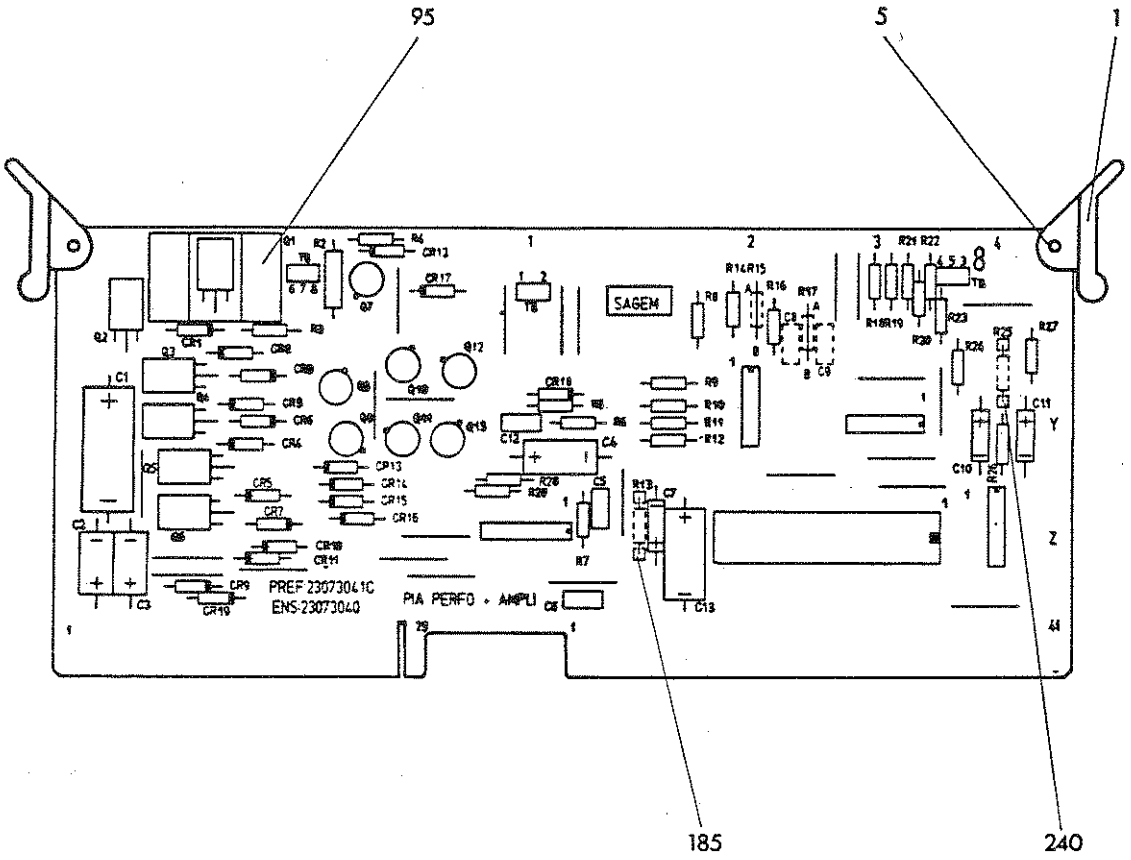


PLATE 22A "PIA PERFO + AMPLI" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
180	14329193-3	• RESISTOR 13.7 KOHMS +-1% 1/4W	RS63Y13K7F	52745	01
185	13941918-2	MOUNTING POST	E216P5LP2	53573	02
190	14339095-0	RESISTOR 1.8 KOHMS +-5% 1/4W R14	RC2T1K8J	52745	01
195	14339094-7	RESISTOR 1 KOHM +-5% 1/4W R16-R18	RC2T1KJ	52745	02
196	14339105-6	RESISTOR 560 OHMS +-5% 1/4W R19	RC2T560UJ	52745	01
200	14339095-0	RESISTOR 1.8 KOHMS +-5% 1/4W ..... R20 A R24	RC2T1K8J	52745	05
205	23081649-8	RESISTOR (TO BE DETERMINED DURING TESTS) R25	23081649-8	53840	01
210	14328364-7	• RESISTOR 8.25 KOHMS +-1% 1/4W	RS63Y8K25F	52745	01
215	14328365-0	• RESISTOR 9.09 KOHMS +-1% 1/4W	RS63Y9K09F	52745	01
220	14329190-4	• RESISTOR 10.2 KOHMS +-1% 1/4W	RS63Y10K2F	52745	01
225	14329191-2	• RESISTOR 11.5 KOHMS +-1% 1/4W	RS63Y11K5F	52745	01
230	14329192-5	• RESISTOR 12.4 KOHMS +-1% 1/4W	RS63Y12K4F	52745	01
235	14329193-3	• RESISTOR 13.7 KOHMS +-1% 1/4W	RS63Y13K7F	52745	01
240	13941918-2	MOUNTING POST	E216P5LP2	53573	02
245	14339098-9	RESISTOR 2.2 KOHMS +-5% 1/4W R26	RC2T2K2J	52745	01
250	14339102-2	RESISTOR 18 KOHMS +-5% 1/4W R27	RC2T18KJ	52745	01
255	14339126-7	RESISTOR 3.9 KOHMS +-5% 1/4W R28	RC2T3K9J	52745	01
260	14339089-8	RESISTOR 100 OHMS +-5% 1/4W R29	RC2T100UJ	52745	01
265	13233839-7	CONNECTOR (3 PIN) ..... TB	22-05-2031	59191	03
270	14049058-4	INTEGRATED CIRCUIT Y02	SN7404N	52367	01
275	14049059-7	INTEGRATED CIRCUIT Y03	SN7406N	52367	01
280	14049768-2	INTEGRATED CIRCUIT Z01	DM8602N	18767	01
285	14049752-0	INTEGRATED CIRCUIT Z03	MC6821P	56687	01
290	14049768-2	INTEGRATED CIRCUIT Z04	DM8602N	18767	01

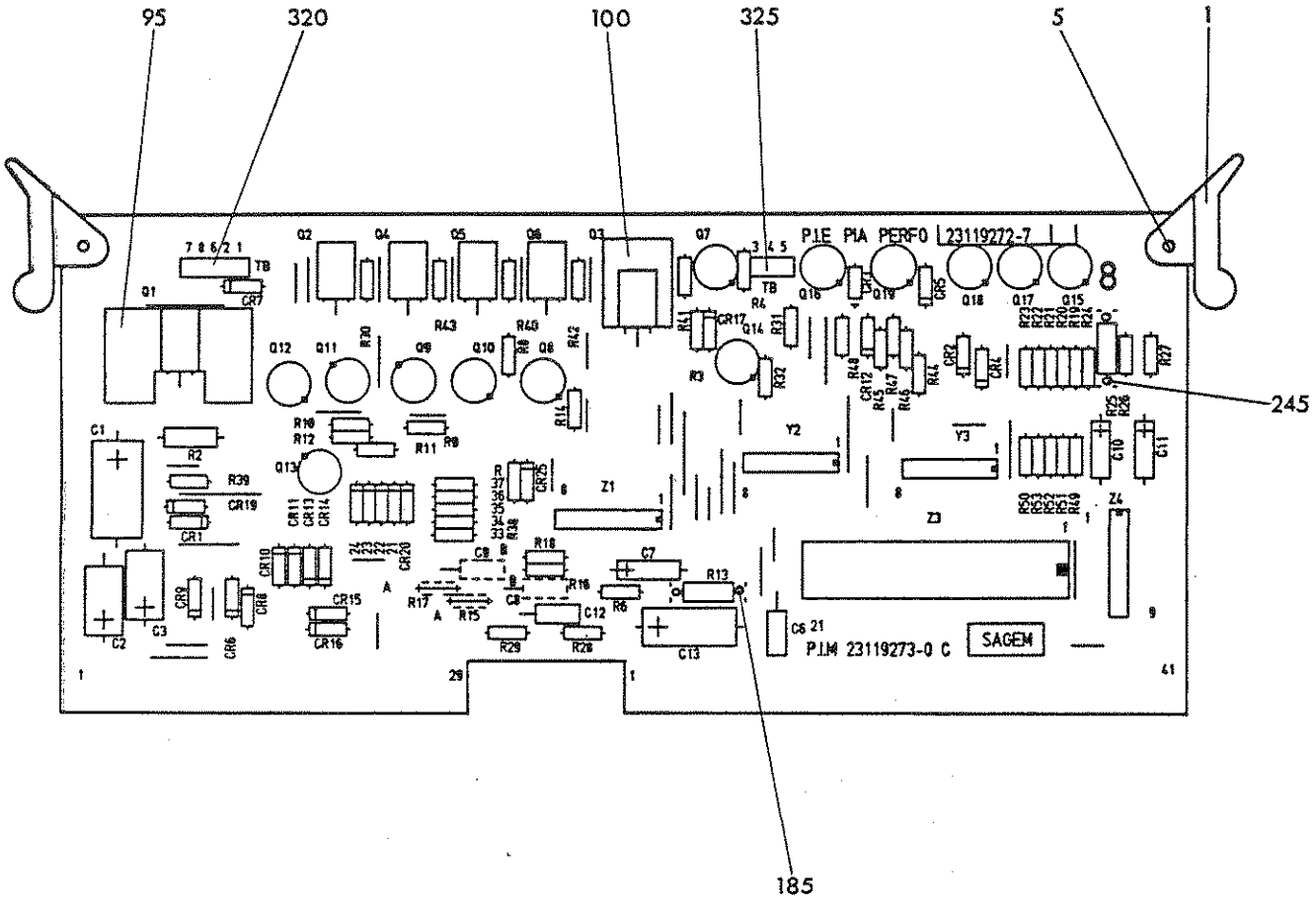


PLATE 22B "PIA PERFO + AMPLI" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14018681-2	DIODE CR01	1N4003	10072	01
15	14019002-2	DIODE ..... CR02 A CR05	1N4148	52745	04
20	14018681-2	DIODE ..... CR06 A CR11	1N4003	10072	06
25	14019002-2	DIODE CR12	1N4148	52745	01
30	14018681-2	DIODE ..... CR13 A CR16	1N4003	10072	04
35	14019002-2	DIODE CR17	1N4148	52745	01
40	14011703-1	DIODE CR19	BZV47C3V9	52183	01
45	14019002-2	DIODE ..... CR20 A CR25	1N4148	52745	06
50	14428452-8	CAPACITOR 63V 47MF -10+50% C01	222201618479	51956	01
55	14428440-3	CAPACITOR 25V 10MF -10+100% C02-C03	222201516109	51956	02
60	14458203-1	CAPACITOR 16V 22NF +80-20% C06	GFB606-22KJL	51350	01
65	14438278-3	CAPACITOR 35V 1MF +-10% C07	CTS13-35V1MK	52745	01
70	14438281-6	CAPACITOR 35V 2.2MF +-10% C10	CTS13-35V2M2K	52745	01
75	14438277-5	CAPACITOR 35V 0.1MF +-10% C11	CTS13-35V100KK	52745	01
80	14458019-4	CAPACITOR 63V 470PF +-10% C12	222263003471	51956	01
85	14428442-4	CAPACITOR 20V 47MF -10+100% C13	222201616479	51956	01
90	14038363-5	TRANSISTOR Q01	BD680	18767	01
95	23075850-0	RADIATOR	23075850-0	53840	01
	15621131-4	SCREW CL M2.5X10	E27116C25Q10CAUP	50035	01
	15700663-4	WASHER A DIAM 2.5	500251-24	51689	01
	15500016-8	NUT H M2.5	E27411A25QQFUL	50035	01
100	23118682-8	RADIATOR	23118682-8	53840	01
	15621131-4	SCREW CL M2.5X10	E27116C25Q10CAUP	50035	01
	15500016-8	NUT H M2.5U	E27411A25QQFUL	50035	01
	15700663-4	WASHER A DIAM 2.5	500251-24	51689	01
105	14038362-2	TRANSISTOR ..... Q02 A Q06	BD679	18767	05
110	14038854-9	TRANSISTOR Q07	2N2222A	52745	01
115	14038853-1	TRANSISTOR ..... Q08 A Q13	2N2219A	52745	06
120	14039013-5	TRANSISTOR ..... Q14 A Q19	2N2907A	52745	06
125	14338348-9	RESISTOR 3.3 KOHMS +-5% 1/2W R02	RC3T3K3J	52745	01
130	14338191-4	RESISTOR 220 OHMS +-5% 1/4W R03	RC2T220UJ	52745	01
135	14338195-6	RESISTOR 470 OHMS +-5% 1/4W R04	RC2T470UJ	52745	01
140	14338212-7	RESISTOR 2.2 KOHMS +-5% 1/4W R06	RC2T2K2J	52745	01
145	14338219-8	RESISTOR 4.7 KOHMS +-5% 1/4W ..... R08 A R12	RC2T4K7J	52745	05

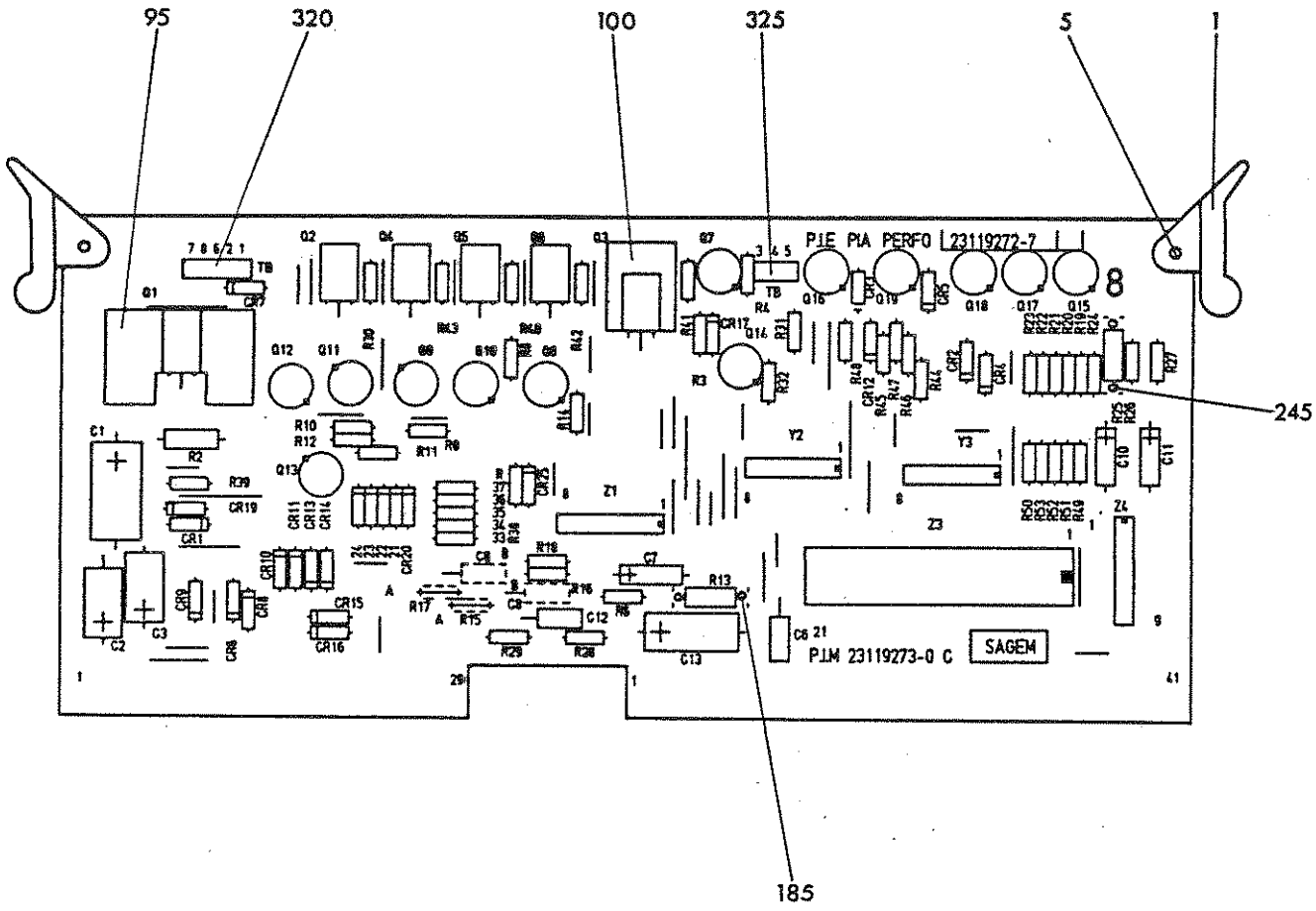


PLATE 22B "PIA PERFO + AMPLI" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
150	23081649-8	RESISTOR (TO BE DETERMINED DURING TESTS) R13	23081649-8	53840	01
155	14328364-7	. RESISTOR 8.25 KOHMS +-1% 1/4W	RS63Y8K25F	52745	01
160	14328365-0	. RESISTOR 9.09 KOHMS +-1% 1/4W	RS63Y9K09F	52745	01
165	14329190-4	. RESISTOR 10.2 KOHMS +-1% 1/4W	RS63Y10K2F	52745	01
170	14329191-2	. RESISTOR 11.5 KOHMS +-1% 1/4W	RS63Y11K5F	52745	01
175	14329192-5	. RESISTOR 12.4 KOHMS +-1% 1/4W	RS63Y12K4F	52745	01
180	14329193-3	. RESISTOR 13.7 KOHMS +-1% 1/4W	RS63Y13K7F	52745	01
185	13941918-2	MOUNTING POST	E216P5LP2	53573	02
190	14338219-8	RESISTOR 4.7 KOHMS +-5% 1/4W R14	RC2T4K7J	52745	01
195	14338199-8	RESISTOR 1 KOHM +-5% 1/4W R16-R18	RC2T1KJ	52745	02
200	14338195-6	RESISTOR 470 OHMS +-5% 1/4W ..... R19 A R23	RC2T470UJ	52745	05
205	14338206-0	RESISTOR 1.8 KOHMS +-5% 1/4W R24	RC2T1K8J	52745	01
210	23081649-8	RESISTOR (TO BE DETERMINED DURING TESTS) R25	23081649-8	53840	01
215	14328364-7	. RESISTOR 8.25 KOHMS +-1% 1/4W	RS63Y8K25F	52745	01
220	14328365-0	. RESISTOR 9.09 KOHMS +-1% 1/4W	RS63Y9K09F	52745	01
225	14329190-4	. RESISTOR 10.2 KOHMS +-1% 1/4W	RS63Y10K2F	52745	01
230	14329191-2	. RESISTOR 11.5 KOHMS +-1% 1/4W	RS63Y11K5F	52745	01
235	14329192-5	. RESISTOR 12.4 KOHMS +-1% 1/4W	RS63Y12K4F	52745	01
240	14329193-3	. RESISTOR 13.7 KOHMS +-1% 1/4W	RS63Y13K7F	52745	01
245	13941918-2	MOUNTING POST	E216P5LP2	53573	02
250	14338212-7	RESISTOR 2.2 KOHMS +-5% 1/4W R26	RC2T2K2J	52745	01
255	14338228-4	RESISTOR 18 KOHMS +-5% 1/4W R27	RC2T18KJ	52745	01
260	14338217-7	RESISTOR 3.9 KOHMS +-5% 1/4W R28	RC2T3K9J	52745	01
265	14338187-3	RESISTOR 100 OHMS +-5% 1/4W R29	RC2T100UJ	52745	01
270	14338219-8	RESISTOR 4.7 KOHMS +-5% 1/4W R30	RC2T4K7J	52745	01
275	14338195-6	RESISTOR 470 OHMS +-5% 1/4W R31	RC2T470UJ	52745	01
280	14338200-7	RESISTOR 1.2 KOHMS +-5% 1/4W R32	RC2T1K2J	52745	01
285	14338194-8	RESISTOR 390 OHMS +-5% 1/4W ..... R33 A R38	RC2T390UJ	52745	06
290	14338212-7	RESISTOR 2.2 KOHMS +-5% 1/4W R39	RC2T2K2J	52745	01
295	14338219-8	RESISTOR 4.7 KOHMS +-5% 1/4W ..... R40 A R43	RC2T4K7J	52745	04
300	14338191-4	RESISTOR 220 OHMS +-5% 1/4W R44	RC2T220UJ	52745	01
305	14338199-8	RESISTOR 1 KOHM +-5% 1/4W R45	RC2T1KJ	52745	01
310	14338191-4	RESISTOR 220 OHMS +-5% 1/4W ..... R46 A R48	RC2T220UJ	52745	03
315	14338200-7	RESISTOR 1.2 KOHMS +-5% 1/4W ..... R49 A R53	RC2T1K2J	52745	05
320	13233840-9	CONNECTOR (5 PIN)	22-05-2051	59191	01
325	13233839-7	CONNECTOR (3 PIN) ..... TB	22-05-2031	59191	01
330	14049059-7	INTEGRATED CIRCUIT Y02	SN7406N	52367	01
335	14049060-9	INTEGRATED CIRCUIT Y03	SN7407N	52367	01
340	14049768-2	INTEGRATED CIRCUIT Z01	DM8602N	18767	01
345	14049752-0	INTEGRATED CIRCUIT Z03	MC6821P	52367	01
350	14049768-2	INTEGRATED CIRCUIT Z04	DM8602N	18767	01

ASSEMBLY SUMMARY SHEET

"PERSONNALISATION" BOARD

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23074359-6	49	To replace extractors	23				

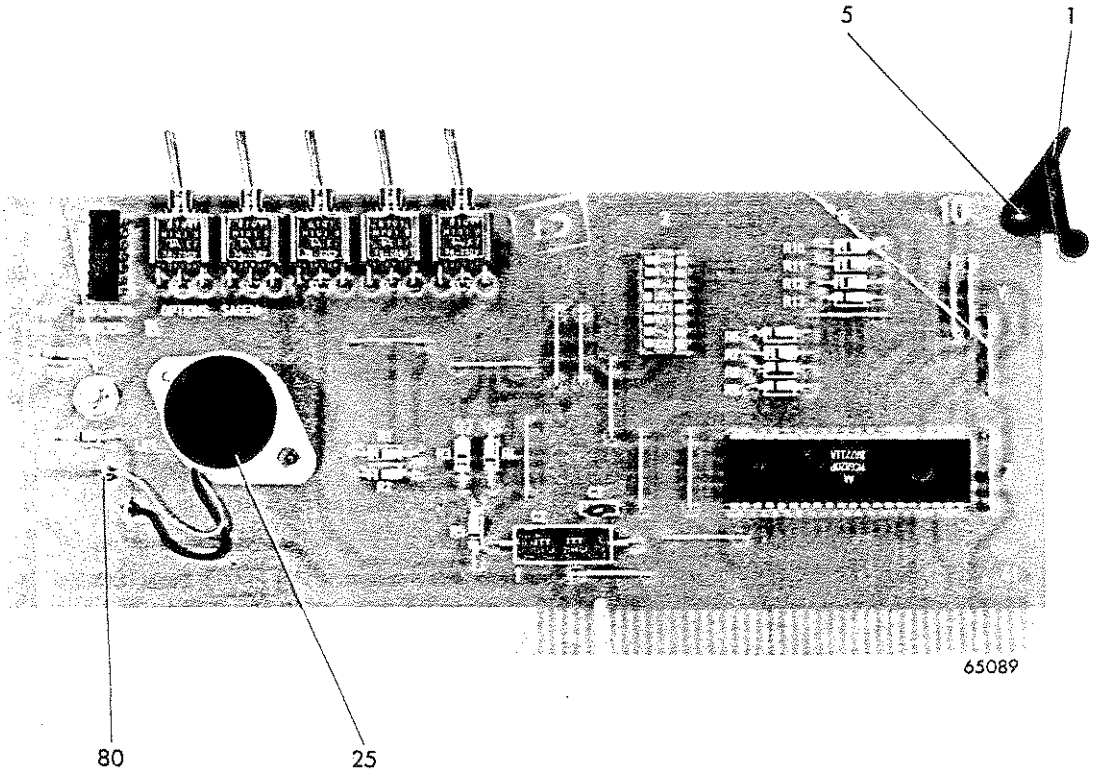


PLATE 23 "PERSONNALISATION" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	14458203-1	CAPACITOR 16V 22NF +80-20% C01	GFB606-22KJL	51350	01
15	14428442-4	CAPACITOR 25V 47MF +50-10% C02	222201616479	51956	01
20	13510312-6	BUZZER LF01	RMB06	52270	01
	15621066-9	SCREW CL M2.5X8	E27116C25Q8QEUL	50035	02
	15700288-9	WASHER M2.5U	E27611M25AAUL	50035	02
	15500016-8	NUT H M2.5	E27411A25QQFUL	50035	02
25	23073459-2	INSULATOR	23073459-2	53840	01
30	14038854-9	TRANSISTOR Q01	2N2222A	52745	01
40	14339100-1	RESISTOR 10 KOHMS +-5% 1/4W ..... R01 A R13	RC2T10KJ	52745	13
45	14339095-0	RESISTOR 1.8 KOHMS +-5% 1/4W R14	RC2T1K8J	52745	01
50	14338205-2	RESISTOR 22 OHMS +-5% 1/4W R15	RC2T22UJ	52745	01
55	13211820-8	SWITCH ..... SW01 A SW05	5236AD1W13	50116	05
60	14049058-4	INTEGRATED CIRCUIT Y01	SN7404N	52367	01
65	13219011-4	SWITCH Y02	1-435668-8	50075	01
70	14049752-0	INTEGRATED CIRCUIT Z03	MC6821P	56687	01
80	13941640-9	LUG	E215-5	53573	02

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23100200-6	5	New filter board	00 25 B	23075644-4	F	25579	
	31	To change the mains fuse value from 1,25 ATD to 0,8 ATD	25 B		E	42500	

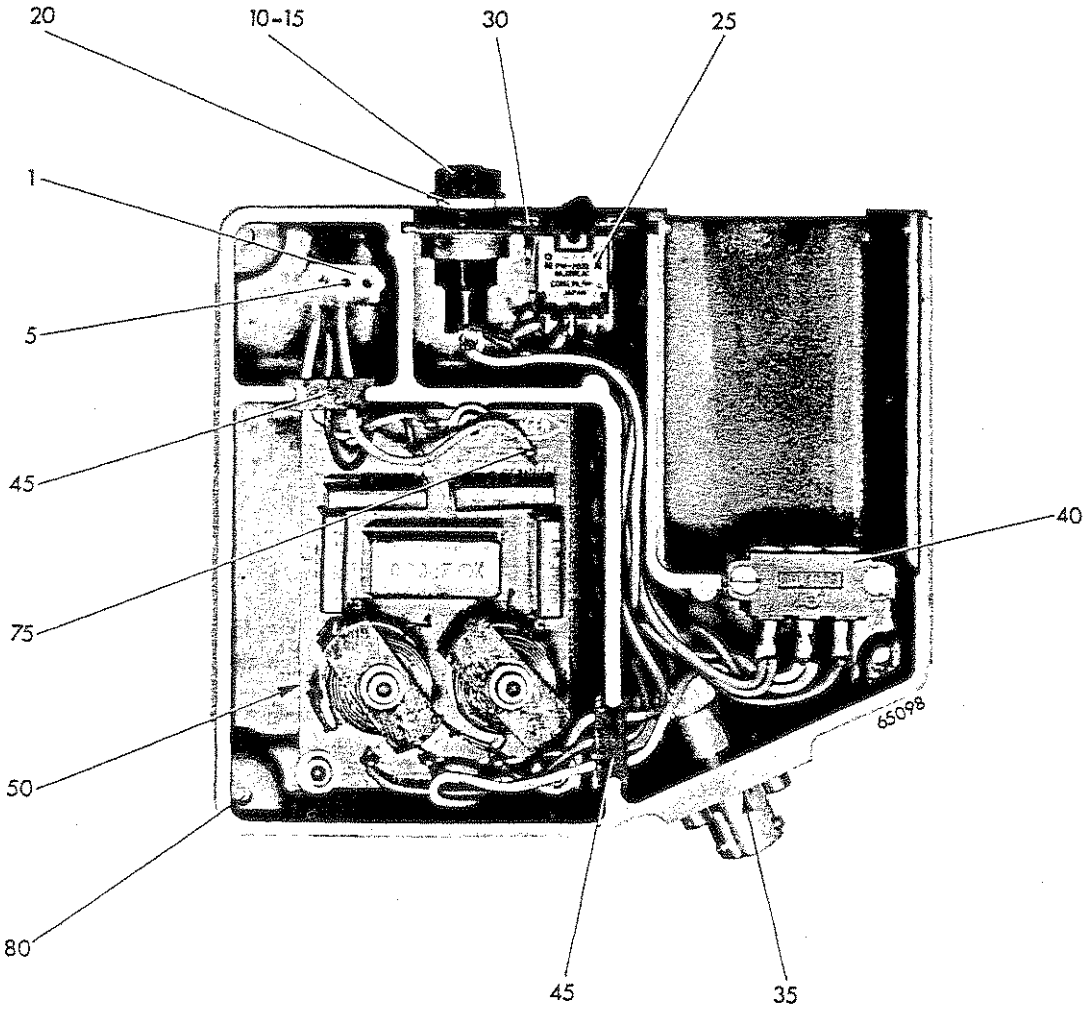


PLATE 25A MAINS FILTER

1	2	3 1 2 3 4 5 6 7	4		5
1	13233536-7	CONNECTOR (3 PIN)	03-06-1032	59191	01
5	13241290-3	FEMALE CONTACT	02-06-1103	59191	03
10	**********	FUSE CARTRIDGE (SEE PLATE 00 ITEM 65) F01	**********		PM
15	13271423-7	FUSE HOLDER	FEP031-1001	99996	01
20	23077938-0	SPACER	23077938-0	53840	01
25	13211821-1	SWITCH	PW2022	55242	01
30	23074399-7	SWITCH SUPPORT	23074399-7	53840	01
35	13239216-9	COLLAR BASE	850C00ES8-3APN2	52207	01
	15600048-0	SCREW CHC M3X65X6	E27161-30Q6QVUL	50035	02
40	13231095-1	CONNECTOR (3 PIN)	8140-06	52270	01
	15630721-9	SCREW F/90 M2.5X16	E27113B25M16QEUL	50035	02
45	23074397-6	WIRE PASS	23074397-6	53840	02
50	23052109-4	MAINS FILTER P.B.A.	23052109-4	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	03
55	14414170-7	. CAPACITOR 250V 15NF +-20% ..... C01 A C03	PME271M515	57249	03
60	14414158-8	. CAPACITOR 250V 220NF +-10% C04	PME271M622	57249	01
65	14414170-7	. CAPACITOR 250V 15NF +-20% C05	PME271M515	57249	01
70	23052132-0	. MONTED INDUCTOR L01-L02	23052132-0	53840	02
	15700257-4	. WASHER M3U	E27611M30AAUL	50035	02
	15500019-7	. NUT H M3	E27411A30QQFUL	50035	02
75	13941640-9	. LUG	E215-5	53573	06
- 80	**********	SCREW M3X25 (SEE PLATE 00 ITEM 25)	**********		PM
- 90	**********	WASHER DE3 (SEE PLATE 00 ITEM 25)	**********		PM

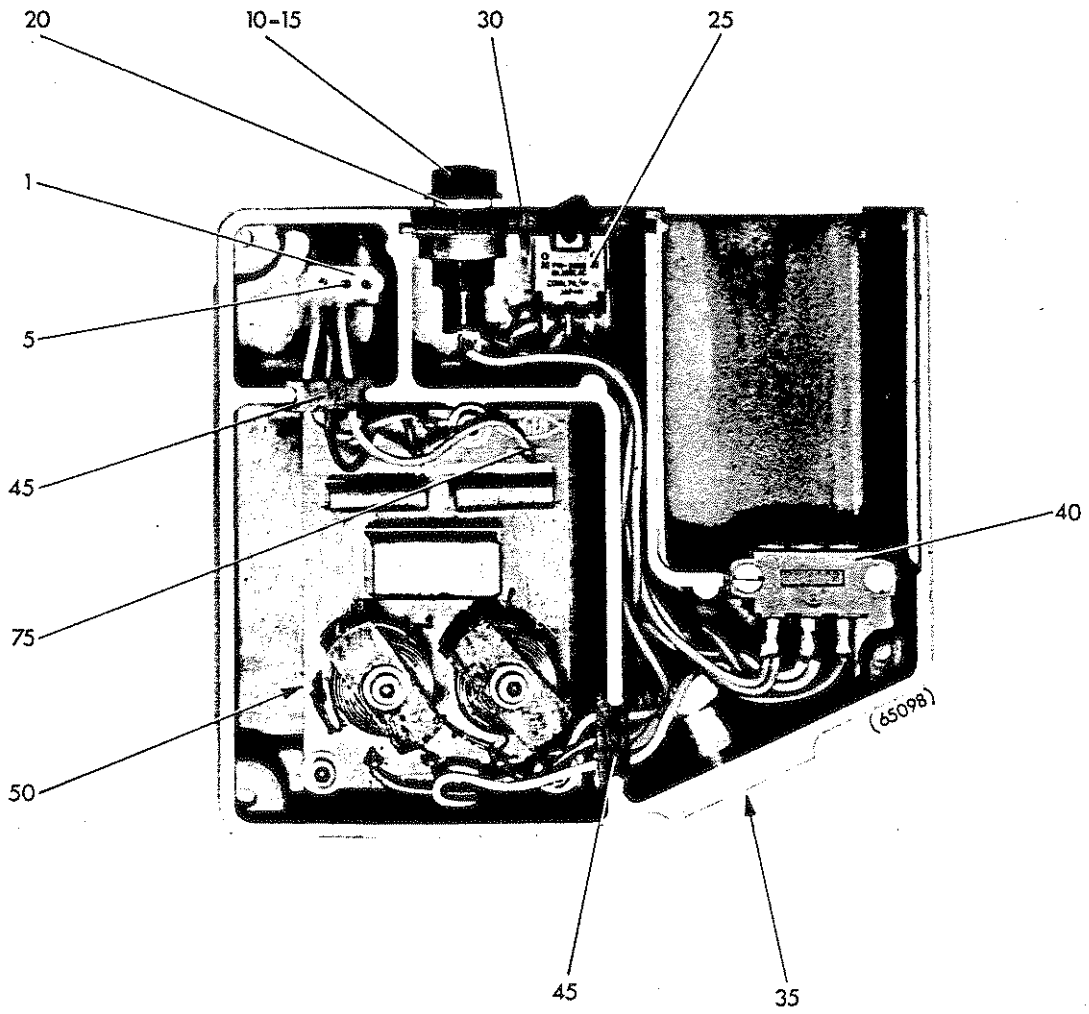


PLATE 25B MAINS FILTER

1	2	3 1 2 3 4 5 6 7	4		5
1	13233536-7	CONNECTOR (3 PIN)	03-06-1032	59191	01
5	13241290-3	FEMALE CONTACT	02-06-1103	59191	03
10	**********	FUSE CARTRIDGE (SEE PLATE 00 ITEM 65)	**********		PM
15	13271557-8	FUSE HOLDER	FEF031-1081	99996	01
20	23077938-0	SPACER	23077938-0	53840	01
25	13211821-1	SWITCH	PN2022	55242	01
30	23074399-7	SWITCH SUPPORT	23074399-7	53840	01
35	13239417-1	CONNECTOR (3 PIN)	XLR-LNE-32	99995	01
	15630026-0	SCREW F/90 M2.5X8	E27113B25Q8QEUL	50035	02
40	13231095-1	CONNECTOR (3 PIN)	8140-06	52270	01
	15630721-9	SCREW F/90 M2.5X16	E27113B25M16QEUL	50035	02
45	23074397-6	WIRE PASS	23074397-6	53840	02
50	23101989-5	MAINS FILTER P.B.A.	23101989-5	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	03
55	14414181-4	• CAPACITOR 250V 0.01MF +-20% C01-C02	PME271Y510	57249	02
60	14414158-8	• CAPACITOR 250V 220NF +-10% C03	PME271M622	57249	01
65	23052132-0	• MOUNTED INDUCTOR L01-L02	23052132-0	53840	02
	15700257-4	• WASHER M3U	E27611M30AAVL	50035	02
	15500019-7	• NUT H M3	E27411A30QQFUL	50035	02
70	13941640-9	• LUG	E215-5	53573	06
- 80	**********	SCREW M3X25 (SEE PLATE 00 ITEM 25)	**********		PM
- 90	**********	WASHER DE3 (SEE PLATE 00 ITEM 25)	**********		PM

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sërial	Comments
23116823-9		Transformer 240 V	-				
23118882-2	66	New transformer (240 V)	00 26 B				
23120187-3	79	Transformer C.I.	26 C				

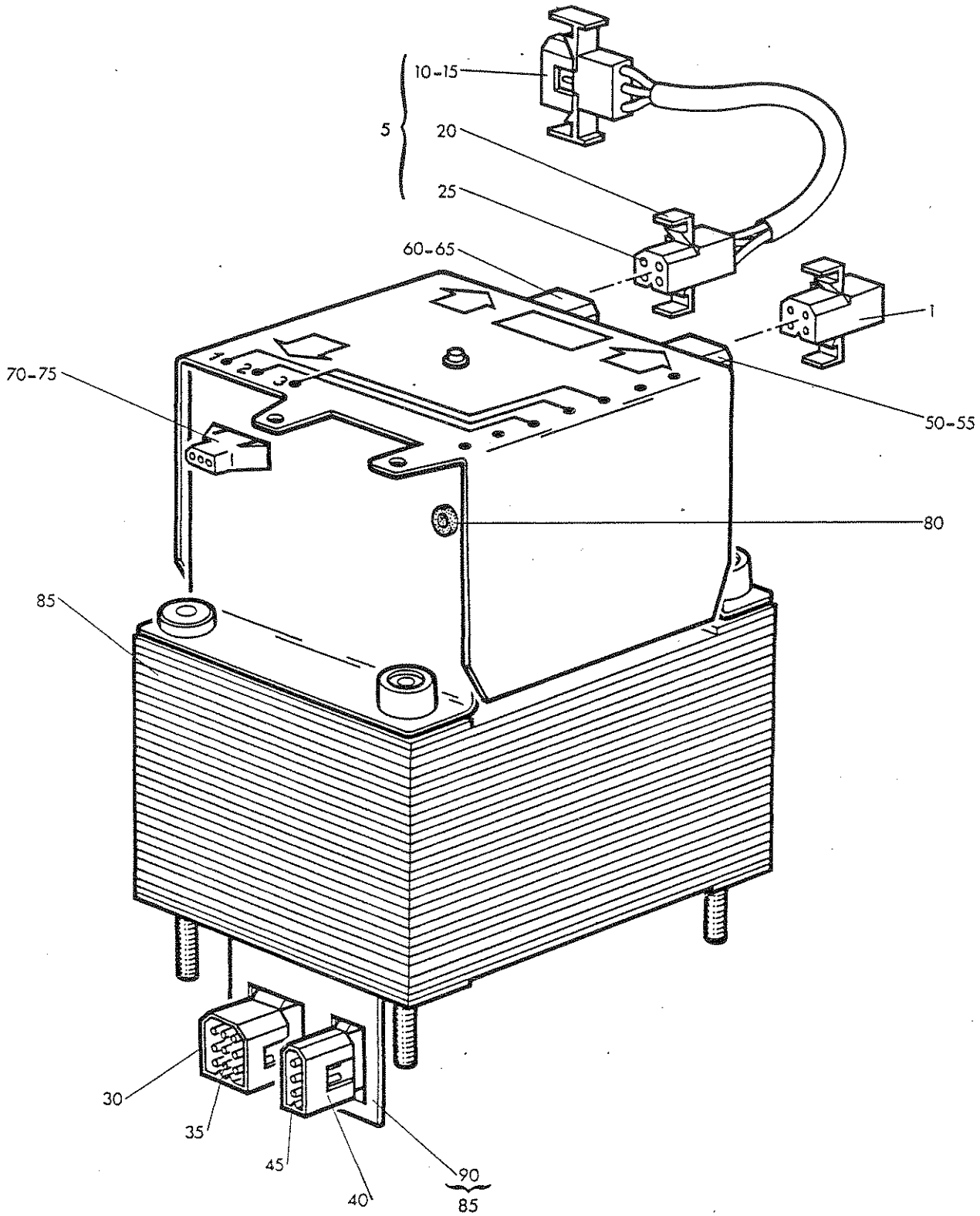


PLATE 26A TRANSFORMER

1	2	3 1 2 3 4 5 6 7	4		5
1	13234844-7	CONNECTOR (PROTECTIVE CAP)	03-06-1043	59191	01
5	23076597-7	WIRING HARNESS	23076597-7	53840	01
10	13233537-0	• CONNECTOR (3 PIN)	03-06-2031	59191	01
15	13241291-6	• MALE CONTACT	02-06-2103	59191	03
20	13234844-7	• CONNECTOR (4 PIN)	03-06-1043	59191	01
25	13241290-3	• FEMALE CONTACT	02-06-1103	59191	03
30	13233673-1	CONNECTOR (9 PIN)	03-06-2091	59191	01
35	13241291-6	MALE CONTACT	02-06-2103	59191	09
40	13233537-0	CONNECTOR (3 PIN)	03-06-2031	59191	01
45	13241291-6	MALE CONTACT	02-06-2103	59191	03
50	13234843-4	CONNECTOR (4 PIN)	03-06-2043	59191	01
55	13241291-6	MALE CONTACT	02-06-2103	59191	03
60	13234843-4	CONNECTOR (4 PIN)	03-06-2043	59191	01
65	13241291-6	MALE CONTACT	02-06-2103	59191	03
70	13233526-3	CONNECTOR (3 PIN)	03-06-1031	59191	01
75	13241327-3	FEMALE CONTACT	02-06-1132	59191	03
80	13920411-4	WIRE PASS	107007-10	52310	01
85	23102064-5	POWER SUPPLY	23102064-5	53840	01
90	23059300-3	• PLUGS SUPPORT PLATE	23059300-3	53840	01
	15700289-7	• WASHER M4U	E27611M40AAUL	50035	06
	15500022-0	• NUT H M4	E27411A40QQFUL	50035	04
	23074633-1	• INSULATING SLEEVE	23074633-1	53840	07

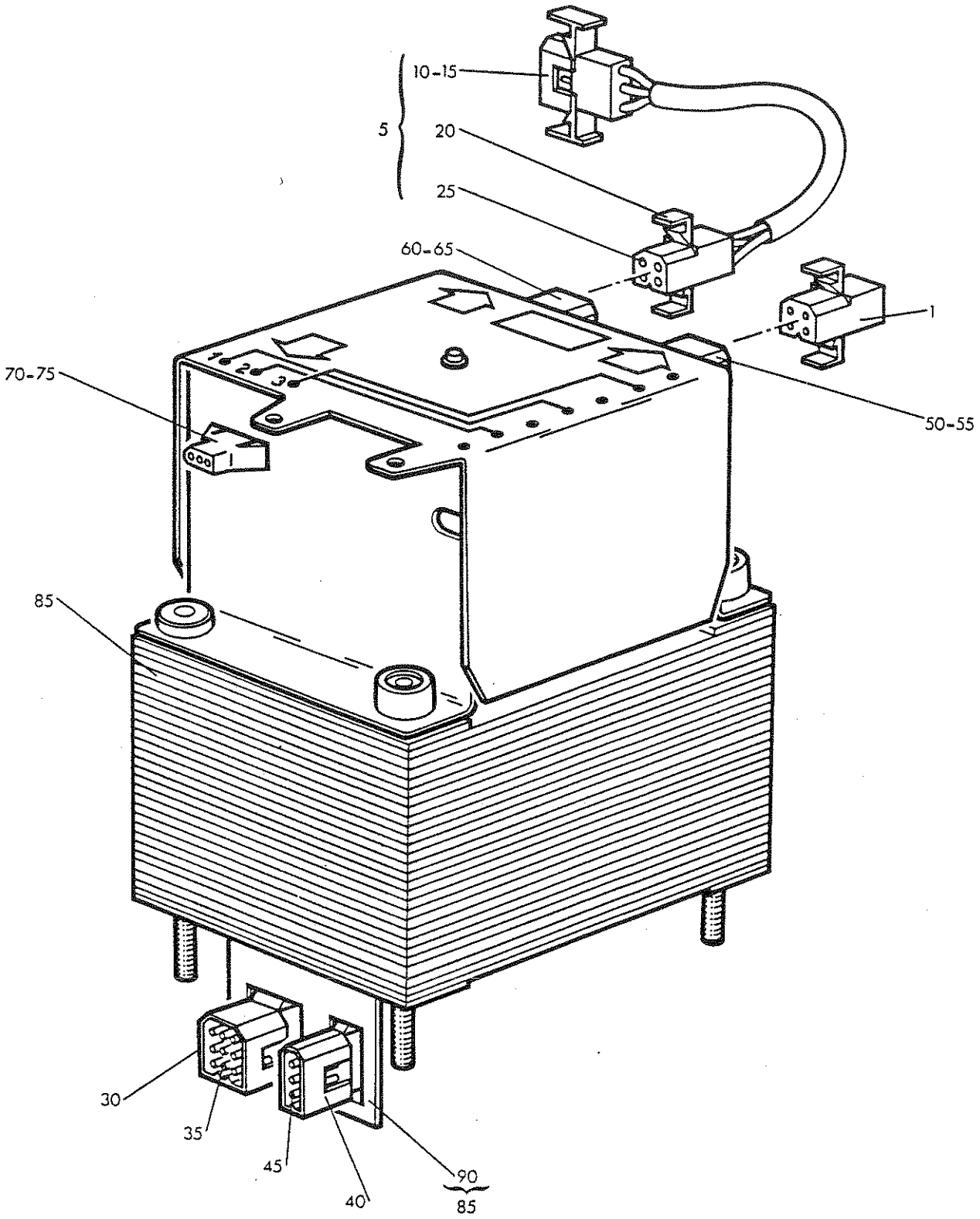


PLATE 26B TRANSFORMER

1	2	3 1 2 3 4 5 6 7	4		5
1	13234844-7	CONNECTOR (PROTECTIVE CAP)	03-06-1043	59191	01
5	23076597-7	WIRING HARNESS	23076597-7	53840	01
10	13233537-0	• CONNECTOR (3 PIN)	03-06-2031	59191	01
15	13241291-6	• MALE CONTACT	02-06-2103	59191	03
20	13234844-7	• CONNECTOR (4 PIN)	03-06-1043	59191	01
25	13241290-3	• FEMALE CONTACT	02-06-1103	59191	03
30	13233673-1	CONNECTOR (9 PIN)	03-06-2091	59191	01
35	13241291-6	MALE CONTACT	02-06-2103	59191	09
40	13233537-0	CONNECTOR (3 PIN)	03-06-2031	59191	01
45	13241291-6	MALE CONTACT	02-06-2103	59191	03
50	13234843-4	CONNECTOR (4 PIN)	03-06-2043	59191	01
55	13241291-6	MALE CONTACT	02-06-2103	59191	03
60	13234843-4	CONNECTOR (4 PIN)	03-06-2043	59191	01
65	13241291-6	MALE CONTACT	02-06-2103	59191	03
70	13233526-3	CONNECTOR (3 PIN)	03-06-1031	59191	01
75	13241327-3	FEMALE CONTACT	02-06-1132	59191	03
80	23118813-7	POWER SUPPLY	23118813-7	53840	01
85	23059300-3	• PLUGS SUPPORT PLATE	23059300-3	53840	01
	15700289-7	• WASHER M4U	E27611M40AAUL	50035	06
	15500022-0	• NUT H M4	E27411A40QQFUL	50035	04
	23074633-1	• INSULATING SLEEVE	23074633-1	53840	07

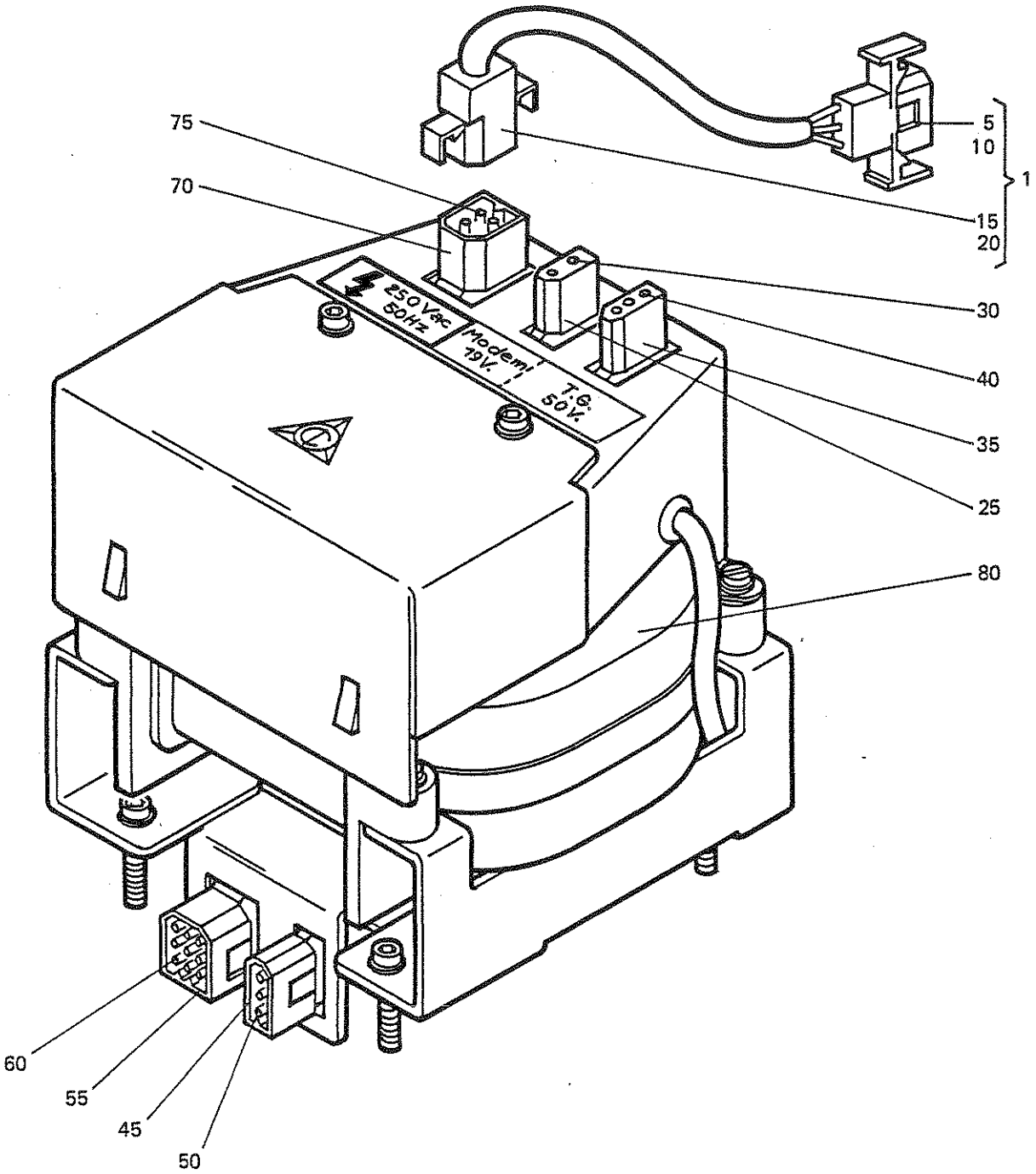


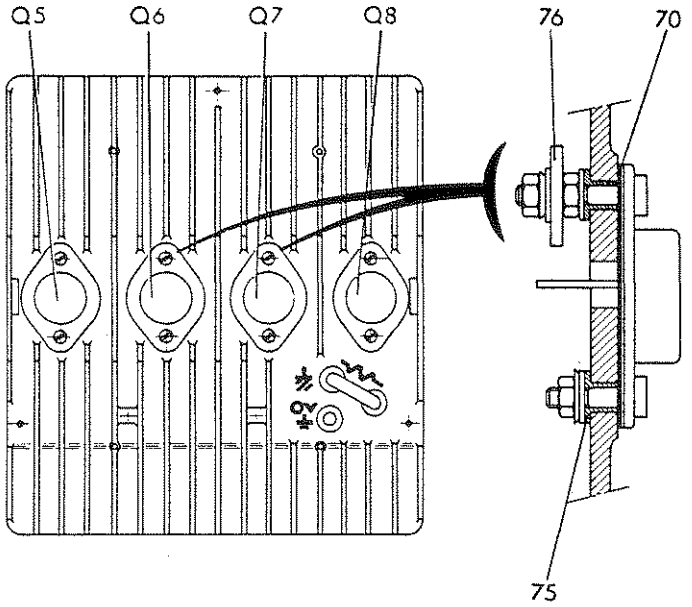
PLATE 26C TRANSFORMER

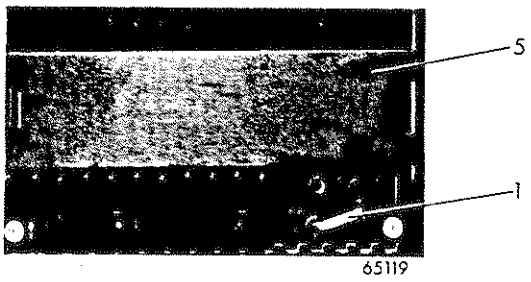
1	2	3 1 2 3 4 5 6 7	4		5
1	23076597-7	WIRING HARNESS	23076597-7	53840	01
5	13233537-7	• CONNECTOR (3 PIN)	03-06-2031	59191	01
10	13241291-6	• MALE CONTACT	02-06-2103	59191	03
15	13234844-7	• CONNECTOR (4 PIN)	03-06-1043	59191	01
20	13241290-3	• FEMALE CONTACT	02-06-1103	59191	03
25	13233826-9	CONNECTOR (2 PIN)	03-06-1022	59191	01
30	13241327-3	MALE CONTACT	02-06-1132	59191	01
35	13233526-3	CONNECTOR (3 PIN)	03-06-1031	59191	01
40	13241327-3	MALE CONTACT	02-06-1132	59191	03
45	13233537-7	CONNECTOR (3 PIN)	03-06-2031	59191	01
50	13241291-6	MALE CONTACT	02-06-2103	59191	01
55	13233673-1	CONNECTOR (9 PIN)	03-06-2091	59191	01
60	13241291-6	MALE CONTACT	02-06-2103	59191	09
70	13234843-4	CONNECTOR (4 PIN)	02-06-2043	59191	01
75	13241291-6	MALE CONTACT	02-06-2103	59191	04
80	23142689-7	TRANSFORMER COIL ASSEMBLY (04-001-99) C.I	23142689-7	53840	01

ASSEMBLY SUMMARY SHEET

POWER AMPLIFIER

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Serial	Comments
23074188-6	26	To add a printed circuit equipped with a thermistor	27				
	81	Suppression of earth strap between OV EL and the ground	27				





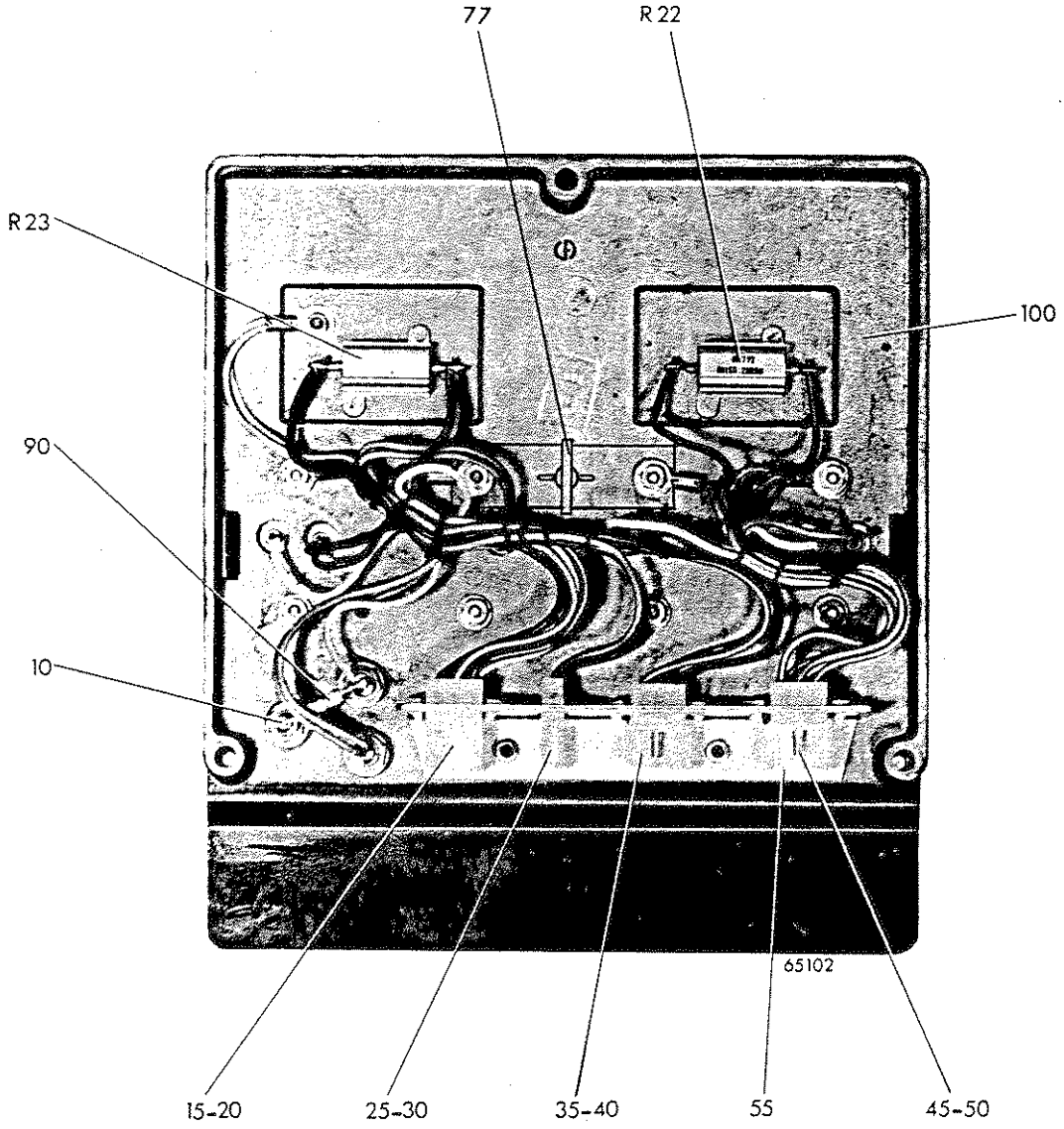


PLATE 27 POWER AMPLIFIER

1	2	3 1 2 3 4 5 6 7	4		5
1	13941084-5	LINK	4X19	51464	01
5	23074804-1	TRANSISTOR COVER	23074804-1	53840	01
10	13947000-7	BLACK CONNECTION BINDING POST	R941920	51950	03
15	13233718-4	CONNECTOR (9 PIN)	03-06-1091	59191	01
20	13241290-3	FEMALE CONTACT	02-06-1103	59191	08
25	13233826-9	CONNECTOR (2 PIN)	03-06-1022	59191	01
30	13241290-3	FEMALE CONTACT	02-06-1103	59191	02
35	13233537-0	CONNECTOR (3 PIN)	03-06-2031	59191	01
40	13241291-6	MALE CONTACT	02-06-2103	59191	03
45	13233673-1	CONNECTOR (9 PIN)	03-06-2091	59191	01
50	13241291-6	MALE CONTACT	02-06-2103	59191	07
55	23074194-8	PLUGS SUPPORT BRACKET	23074194-8	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
60	14038353-6	TRANSISTOR Q05-Q07	MJ2500	56687	02
	15620895-8	SCREW CL M3X12	E27116C30Q12QVUL	50035	03
	15700257-4	WASHER M3U	E27611M30AAUL	50035	03
	15700378-7	LOCK WASHER DIAM 3	520301-24	51689	03
	15500019-7	NUT H M3	E27411A30QQFUL	50035	04
65	14038354-9	TRANSISTOR Q06-Q08	MJ3000	56687	02
	15620895-8	SCREW CL M3X12	E27116C30Q12QVUL	50035	03
	15700257-4	WASHER M3U	E27611M30AAUL	50035	03
	15700378-7	LOCK WASHER DIAM 3	520301-24	51689	03
	15500019-7	NUT H M3	E27411A30QQFUL	50035	04
70	14098037-2	MICA	T03-4	56184	04
75	14098043-4	INSULATOR	T03	56184	08
76	23108844-4	THERMISTOR BOARD EQUIPED	23108844-4	53840	01
77	14340077-2	. THERMISTOR TH1	66391006	51956	01
	15620885-4	SCREW CL M3X16	E27116C30M16QVUL	50035	02
	15700378-7	LOCK WASHER DIAM 3	520301-24	51689	02
	15500019-7	NUT H M3	E27411A30QQFUL	50035	02
80	14318617-4	RESISTOR 0.22 OHMS +-5% 10W R22	RE1U22J	52745	01
	15621020-5	SCREW C M2X6	E27115C20Q6QEUL	50035	02
85	14318616-1	RESISTOR 0.1 OHM +-5% 10W R23	RE1U1J	52745	01
	15621020-5	SCREW C M2X6	E27115C20Q6QEUL	50035	02
90	14339012-4	RESISTOR 4.7 KOHMS +-5% 1/2W	RC3T4K7J	52745	01
100	**********	POWER AMPLIFIER MODULE CASTING	**********		01

ASSEMBLY SUMMARY SHEET

+ 12 V POWER SUPPLY

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Serial	Comments
23079150-0	52	To modify the fixation of the two cables	-			41365	
	74	To change the type of fuse holder	28				

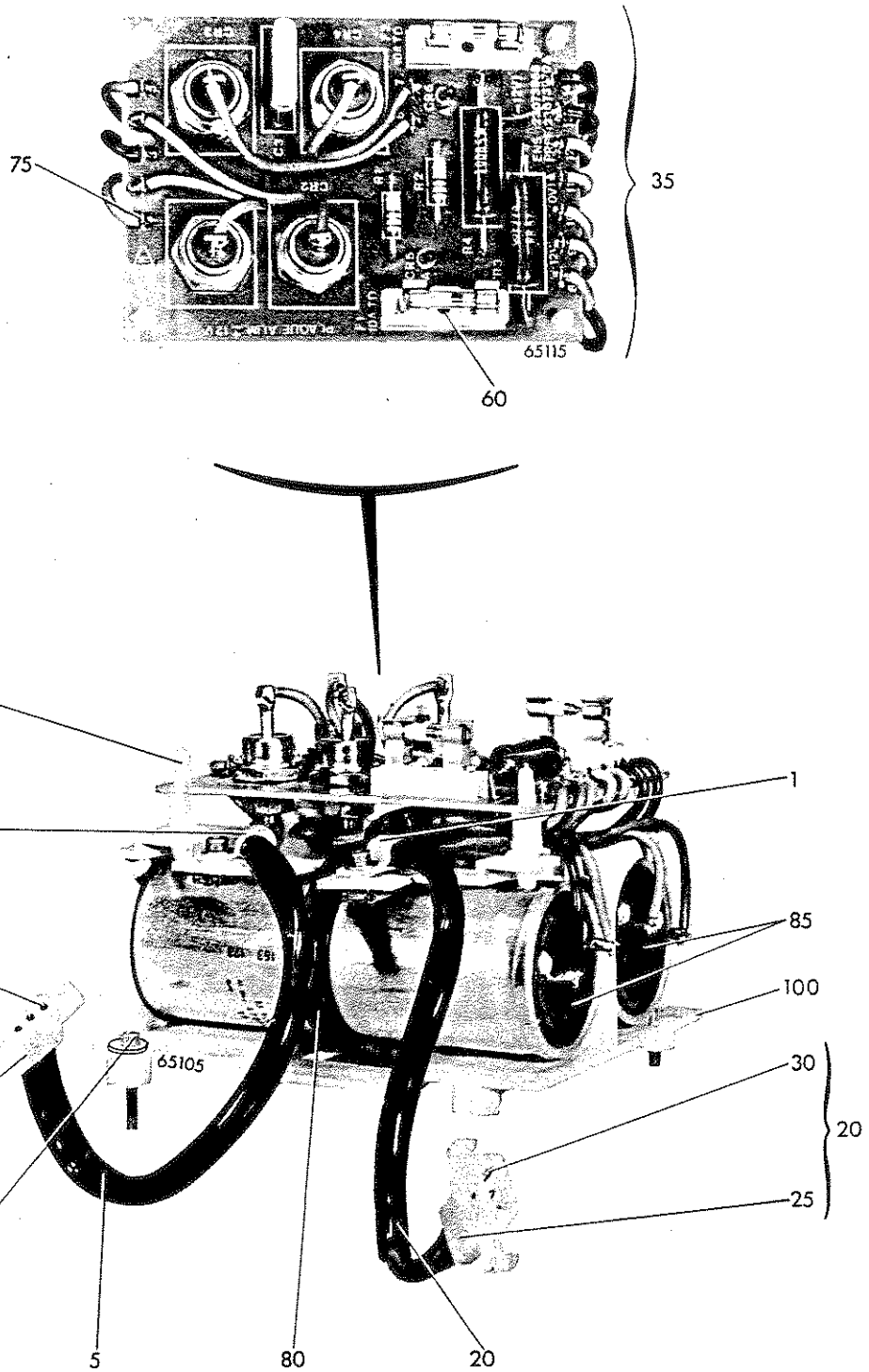


PLATE 28 +12V POWER SUPPLY

1	2	3 1 2 3 4 5 6 7	4		5
1	13941587-9	CABLE CLIP	H3P	53127	02
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
	15700257-4	WASHER M3U	E27611M30AAUL	50035	02
	15500196-2	CAPTIVE NUT	C4843C	52928	02
5	23075567-4	TRANSFORMER CABLE	23075567-4	53840	01
10	13233526-3	• CONNECTOR (3 PIN)	03-06-1031	59191	01
15	13241290-3	• FEMALE CONTACT	02-06-1103	59191	03
20	23079151-8	POWER AMP. CABLE	23079151-8	53840	01
25	13233537-0	• CONNECTOR (3 PIN)	03-06-2031	59191	01
30	13241291-6	• MALE CONTACT	02-06-2103	59191	03
35	23073968-3	POWER SUPPLY P.B.A.	23073968-3	53840	01
40	14019031-6	• DIODE	RN1015	10072	04
		CR01 A CR04			
	15700297-5	• WASHER Z6U	E27611E60AAUL	50035	04
	15700382-8	• LOCK WASHER	520601-24	51689	04
45	14239010-9	• DIODE LED	5082-4484	51148	02
		CR05-CR06			
50	14448440-9	• CAPACITOR 250V 0.47MF +-10%	222235245474	51956	01
		C03			
55	**********	• FUSE CARTRIDGE (SEE PLATE 00 ITEM 66)	**********		PM
		F01-F02			
60	13271671-0	• FUSE HOLDER	910	51464	02
	15620988-0	• SCREW C M3X8	E27115C30Q8CAUPA	50035	02
	15500210-9	• NUT M3	E27411B30QCAUPA	50035	02
65	14339004-1	• RESISTOR 560 OHMS +-5% 1/2W	RC3T560UJ	52745	02
		R01-R02			
70	14319028-0	• RESISTOR 100 OHMS +-5% 6.5W	RB57-100UJ	52745	02
		R03-R04			
75	13941640-9	• LUG	E215-5	53573	14
80	13947004-9	FASTENER	31919	99994	01
85	14428307-1	CAPACITOR 16V 47000MF +50-10%	131-473-016	51596	02
90	12441609-8	P.B.A. SUPPORT	LCBS6N	59191	04
95	23059941-9	SPECIAL SCREW	23059941-9	53840	02
96	15700257-4	WASHER M3	E27611M30AAUL	50035	02
100	**********	PLASTIC FRAME	**********		01

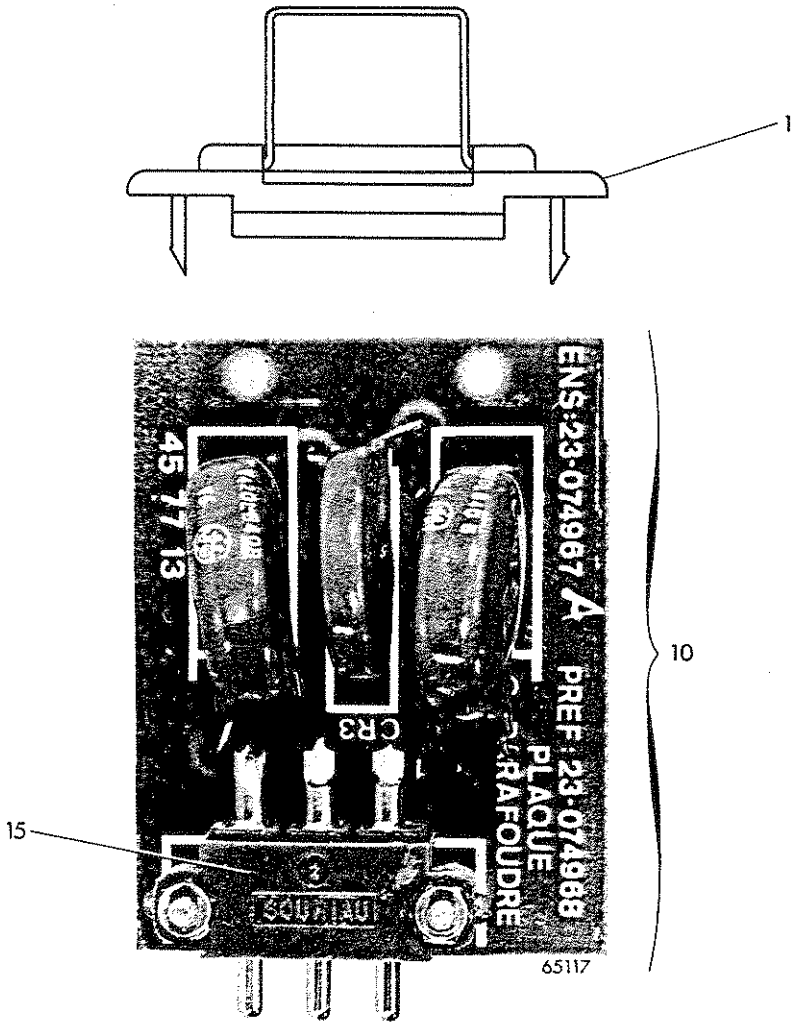


PLATE 29 "PARAFOUDRE" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23074805-4	COVER	23074805-4	53840	01
- 5	12210229-0	CLIP	876030-09	51689	02
10	**********	PARAFOUDRE BOARD (SEE PLATE 00 ITEM 67)	**********		PM
15	13236200-9	• CONNECTOR (3 PIN)	8140-5017	52270	01
	15621133-5	• SCREW CL M2.5X16	E27116C25M16CAUP	50035	02
	15500016-8	• NUT H M2.5	E27411A25QQFUL	50035	02
16	14340060-2	• VARISTOR CR01-CR02	420LB40B	55326	02
17	14340062-3	• VARISTOR CR03	275LA40B	55326	01

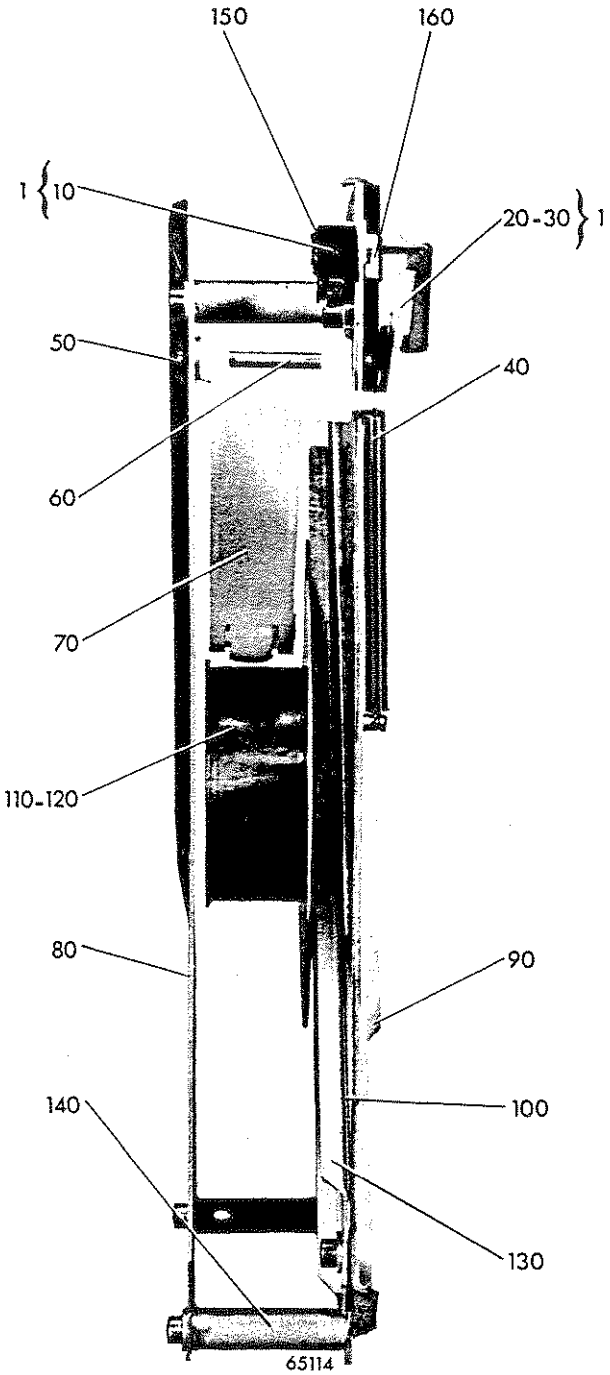


PLATE 30 TAPE STORE

1	2	3 1 2 3 4 5 6 7	4		5
1	**********	TAPE LOW SWITCH AND CORD ASSEMBLY (PLATE 00 .... ITEM 66)	**********		PM
10	13211502-0	. SWITCH	83133002	50614	01
20	13233535-9	. CONNECTOR (2 PIN)	03-06-2022	59191	01
30	13241328-6	. MALE CONTACT	02-06-2132	59191	02
40	23073763-4	SPRING	23073763-4	53840	01
50	12210102-4	CIRCLIP (TRUARC GRIP RING) DIAM 2.3MM	23203AM0023T	50297	02
60	23074520-1	SHAFT	23074520-1	53840	01
70	23079406-4	TAPE LOW LEVER	23079406-4	53840	01
80	23074506-6	BACK PLATE	23074506-6	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	03
90	23074508-7	MOULDED GUIDE ASSEMBLY	23074508-7	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
100	23074510-7	PLATE	23074510-7	53840	01
110	12210104-5	CIRCLIP (TRUARC GRIP RING) DIAM 6MM	23203AM0060T	50297	01
120	23074521-4	HUB	23074521-4	53840	01
130	23074511-5	GUIDE ASSEMBLY	23074511-5	53840	01
140	23074502-4	EDGE SUPPORT	23074502-4	53840	01
150	**********	SCREW-TAPPED PLATE (SEE PLATE 00 ITEM 70)	**********		PM
160	**********	CLAMP (SEE PLATE 00 ITEM 69)	**********		PM
	**********	SCREW C M2X10 (SEE PLATE 00 ITEM 70)	**********		PM

1	2	3 1 2 3 4 5 6 7	4		5
1	23100354-5	WIRING SHOOT (FROM SERIAL NUMBER 12430)	23100354-5	53840	01
5	23100355-8	WIRING SHOOT (FROM SERIAL NUMBER 12430)	23100355-8	53840	01
10	23100356-6	WIRING SHOOT (FROM SERIAL NUMBER 12430)	23100356-6	53840	01
15	23100357-9	WIRING SHOOT (FROM SERIAL NUMBER 12430)	23100357-9	53840	01
20	23075372-9	TRANSFORMER WIRING HARNESS	23075372-9	53840	01
25	13233718-4	. CONNECTOR (9 PIN)	03-06-1091	59191	01
		P25			
- 30	13241290-3	. FEMALE CONTACT	02-06-1103	59191	09
- 35	23073941-9	. HANDLE	23073941-9	53840	01
40	23075374-0	WIRING HARNESS POWER AMPLIFIER	23075374-0	53840	01
45	13233718-4	. CONNECTOR (9 PIN)	03-06-1091	59191	01
		P19			
- 50	13241290-3	. FEMALE CONTACT	02-06-1103	59191	07
- 55	23073941-9	. HANDLE	23073941-9	53840	01
60	23075376-1	WIRING HARNESS DRIVE MOTOR	23075376-1	53840	01
65	13233535-9	. CONNECTOR (2 PIN)	03-06-2022	59191	01
		P17			
- 70	13241291-6	. MALE CONTACT	02-06-2103	59191	02
75	13233535-9	. CONNECTOR (2 PIN)	03-06-2022	59191	01
		J13			
- 80	13241291-6	. MALE CONTACT	02-06-2103	59191	02
85	23075378-2	WIRING HARNESS MEMORY	23075378-2	53840	01
90	23075379-5	WIRING HARNESS POWER AMPLIFIER NO 2	23075379-5	53840	01
95	13233673-1	. CONNECTOR (9 PIN)	03-06-2091	59191	01
		P16			
-100	13241291-6	. MALE CONTACT	02-06-2103	59191	08
-105	23075610-5	. HANDLE	23075610-5	53840	01
-110	13947081-2	. BARE LUG	214	51918	01
115	23075381-5	WIRING HARNESS POWER SUPPLY	23075381-5	53840	01
120	23075382-3	WIRING HARNESS SENSOR	23075382-3	53840	01
125	13233835-5	. CONNECTOR (15 PIN)	03-06-1151	59191	01
		J09			
-130	13241327-3	. FEMALE CONTACT	02-06-1132	59191	14
-135	23073942-7	. HANDLE	23073942-7	53840	01
140	23075385-7	WIRING HARNESS RIBBON ASSEMBLY (LEFT)	23075385-7	53840	01
145	13233826-9	. CONNECTOR (2 PIN)	03-06-1022	59191	01
		J12			
-150	13241327-3	. FEMALE CONTACT	02-06-1132	59191	02
155	23075387-8	WIRING HARNESS PRINTING	23075387-8	53840	01
160	13233718-4	. CONNECTOR (9 PIN)	03-06-1091	59191	01
		J10			
-165	13241327-3	. FEMALE CONTACT	02-06-1132	59191	09
-170	23073941-9	. HANDLE	23073941-9	53840	01
175	23075389-9	WIRING HARNESS RIBBON ASSEMBLY (RIGHT)	23075389-9	53840	01
180	13233828-0	. CONNECTOR (6 PIN)	03-06-1061	59191	01
		J11			
-185	13241327-3	. FEMALE CONTACT	02-06-1132	59191	05
-190	23075391-9	WIRING HARNESS ERT+IT/ADA	23075391-9	53840	01
195	13239227-1	. CONNECTOR (35 PIN)	HE701EV35Z	52745	01
		J01			
200	23119850-0	. WIRING HARNESS LINE STRIP	23119850-0	53840	01
205	23119732-1	. . LINE CONNECTION P.B.A.	23119732-1	53840	01
		TB01			
210	13941640-9	. . . LUG	E215-5	53573	13
215	14211189-7	. . . FILTER	FCF112-2X1KAT	51350	05
220	23075800-5	. . . FILTER SUPPORT	23075800-5	53840	01
225	13944277-7	. . . STRIP (13 PIN)	055953300	99984	01
226	23119853-4	. . . CONNECTION STRIP (13 PIN)	23119853-4	53840	01
227	13941918-2	. . . LUG	E216P5LP2	53573	02
230	23075397-2	. WIRING HARNESS TRANSFORMER TG	23075397-2	53840	01
235	13233537-0	. . CONNECTOR (3 PIN)	03-06-2031	59191	01
		P24			

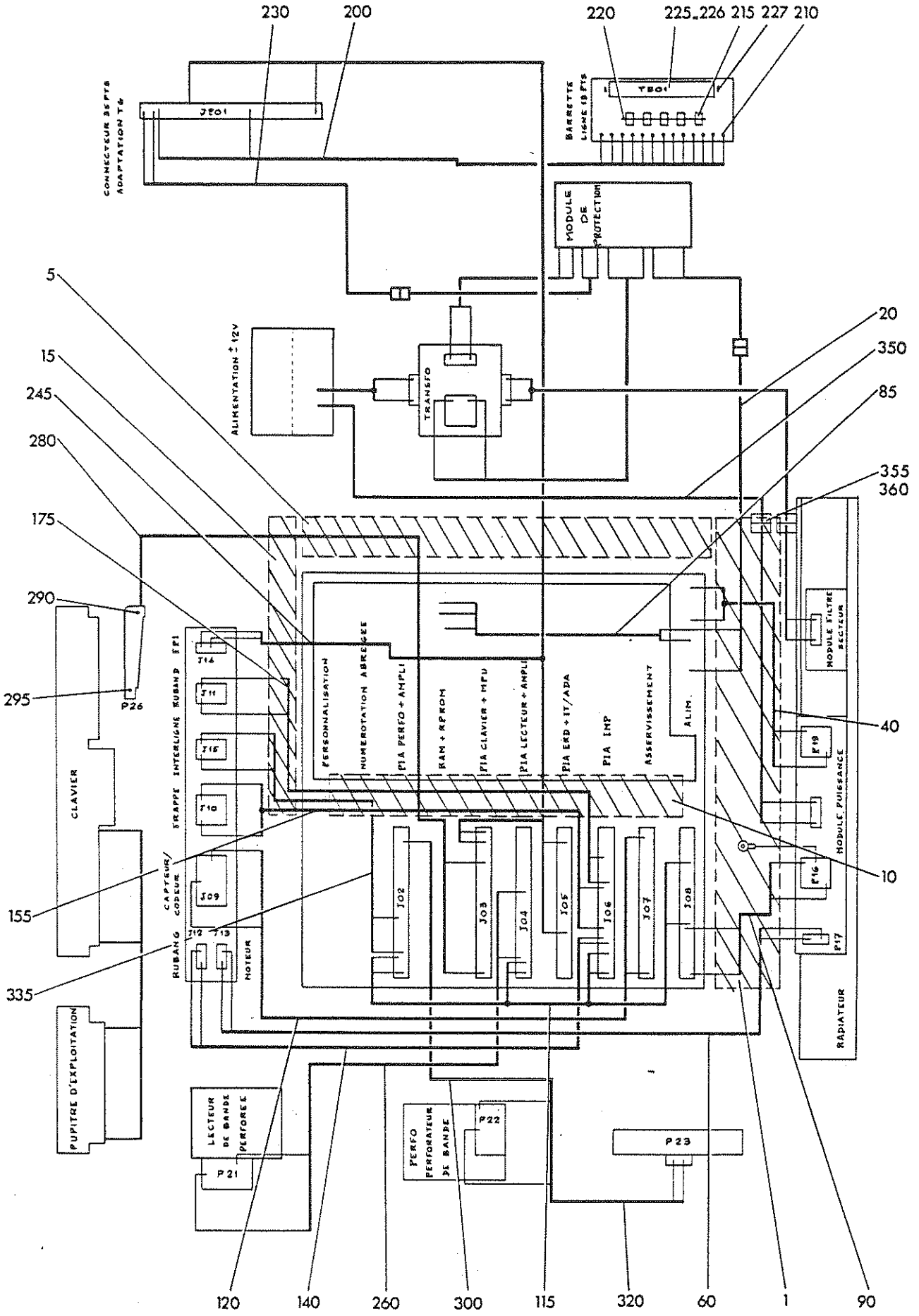


PLATE 31 WIRING HARNESS

1	2	3 1 2 3 4 5 6 7	4		5
-240	13241328-6	. . MALE CONTACT	02-06-2132	59191	03
245	23075395-1	WIRING HARNESS PAPER	23075395-1	53840	01
250	13233537-0	. CONNECTOR (3 PIN)	03-06-2031	59191	01
		J14			
-255	13241328-6	. MALE CONTACT	02-06-2132	59191	02
260	23075399-3	WIRING HARNESS TAPE READER	23075399-3	53840	01
265	13233835-5	. CONNECTOR (15 PIN)	03-06-1151	59191	01
		P21			
-270	13241327-3	. FEMALE CONTACT	02-06-1132	59191	14
-275	23073942-7	. HANDLE	23073942-7	53840	01
280	23075401-5	WIRING HARNESS KEYBOARD	23075401-5	53840	01
285	23115165-6	. CONNECTOR (23 PIN)	23115165-6	53840	01
		P26			
290	13948018-6	. CABLE TIE	T23R	53127	01
295	23075869-1	. LOCATOR	23075869-1	53840	01
	15800602-6	. RIVET	E27532-30-9ADUT	50035	01
300	23075404-9	WIRING HARNESS TAPE PUNCH	23075404-9	53840	01
305	13233837-6	. CONNECTOR (15 PIN)	03-06-2151	59191	01
		P22			
-310	13241328-6	. MALE CONTACT	02-06-2132	59191	15
-315	23075647-3	. HANDLE	23075647-3	53840	01
320	23075406-0	WIRING HARNESS TAPE STORAGE	23075406-0	53840	01
325	13233826-9	. CONNECTOR (2 PIN)	03-06-1022	59191	01
		P23			
-330	13241327-3	. FEMALE CONTACT	02-06-1132	59191	02
335	23075408-1	WIRING HARNESS LINEFEED	23075408-1	53840	01
340	13233830-5	. CONNECTOR (6 PIN)	03-06-2062	59191	01
		J15			
-345	13241328-6	. MALE CONTACT	02-06-2132	59191	06
350	23075640-2	CABLE	23075640-2	53840	01
355	13233526-3	. CONNECTOR (3 PIN)	03-06-1031	59191	02
360	13241290-3	. FEMALE CONTACT	02-06-1103	59191	06

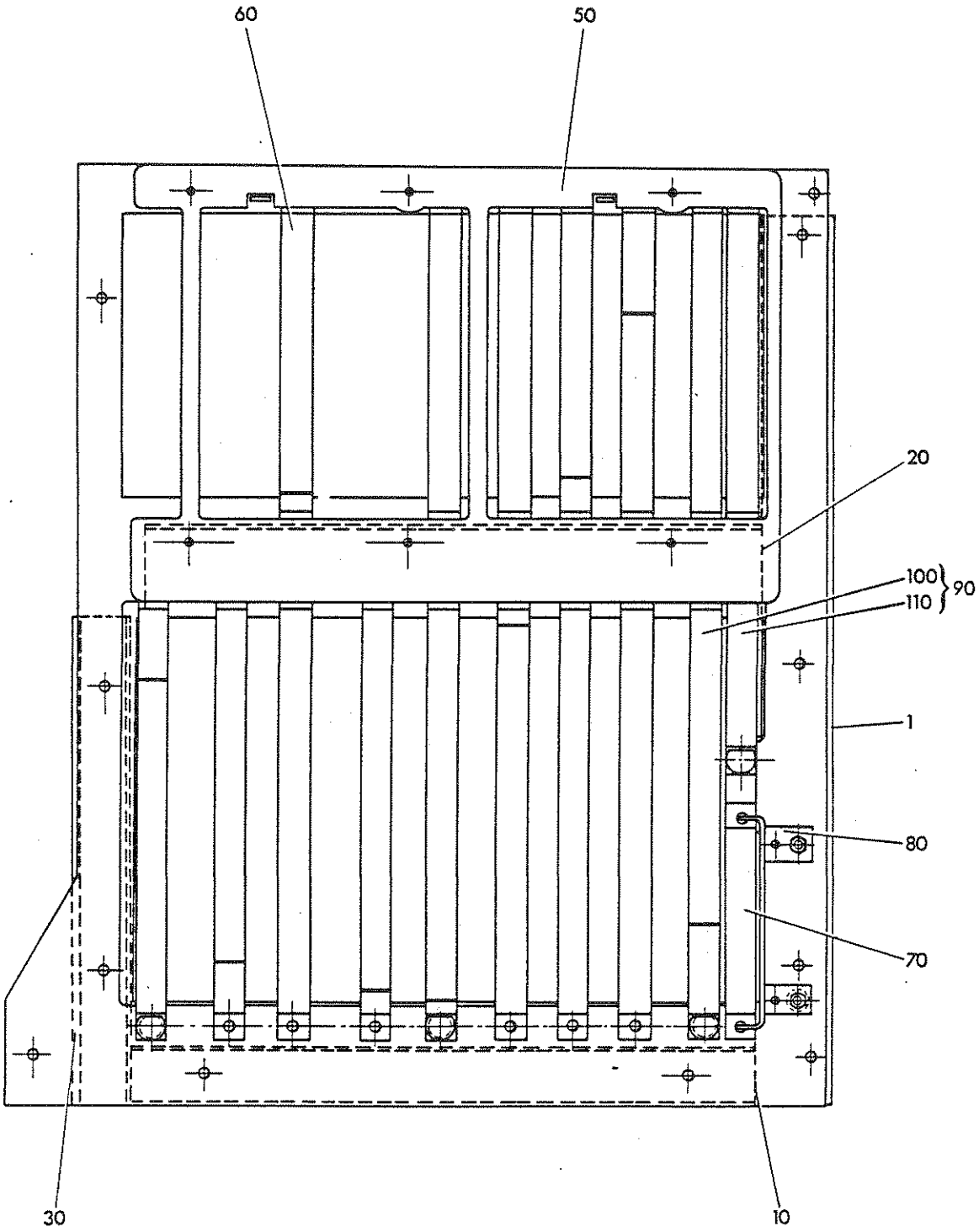
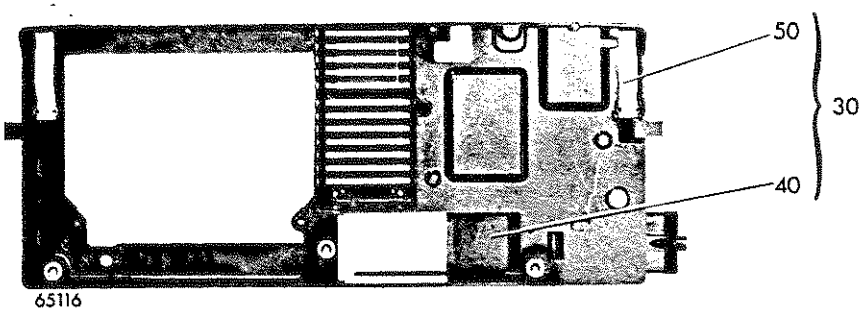


PLATE 32 MAIN BASE

1	2	3 1 2 3 4 5 6 7	4		5
1	23100327-2	WIRING SHOOT (FROM SERIAL NUMBER 12430)	23100327-2	53840	01
	15800119-6	RIVET (FROM SERIAL NUMBER 12430)	TAPD429BS	51464	03
10	23100330-5	WIRING SHOOT (FROM SERIAL NUMBER 12430)	23100330-5	53840	01
	15800119-6	RIVET (FROM SERIAL NUMBER 12430)	TAPD429BS	51464	02
20	23100331-3	WIRING SHOOT (FROM SERIAL NUMBER 12430)	23100331-3	53840	01
	15800119-6	RIVET (FROM SERIAL NUMBER 12430)	TAPD429BS	51464	02
30	23100332-6	WIRING SHOOT (FROM SERIAL NUMBER 12430)	23100332-6	53840	01
	15800119-6	RIVET (FROM SERIAL NUMBER 12430)	TAPD429BS	51464	02
- 40	**********	CONNECTOR ASSEMBLY SUPPORT	**********		01
50	23074762-7	. PLASTIC EDGE CONNECTOR SUPPORT	23074762-7	53840	01
	15690105-4	. SCREW CL N06 9.5	E27131-6P95EDTF	50035	06
60	13238107-5	. EDGE CONNECTOR WITH LOCATOR (29 PIN) ..... J02 A J08	HE701EV29Z	52745	07
70	13238105-4	. EDGE CONNECTOR (17 PIN) J20	HE701EV17Z	52745	01
80	23074229-7	. RIGHT ANGLE CONNECTOR SUPPORT	23074229-7	53840	01
	15600048-0	. SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
	15700257-4	. WASHER M3U	E27611M30AAUL	50035	01
	15500019-7	. NUT H M3	E27411A30QQFUL	50035	02
90	23074401-9	. FITTED MOTHER BOARD	23074401-9	53840	01
	23054939-4	. SPECIAL SCREW	23054939-4	53840	04
	15700257-4	. WASHER M3U	E27611M30AAUL	50035	03
	15500019-7	. NUT H M3	E27411A30QQFUL	50035	04
100	13238102-0	. . EDGE CONNECTOR (41 PIN) + LOCATOR	HE701EV41Y	52745	09
110	13239223-9	. . EDGE CONNECTOR (11 PIN)	HE701EV11Y	52745	01



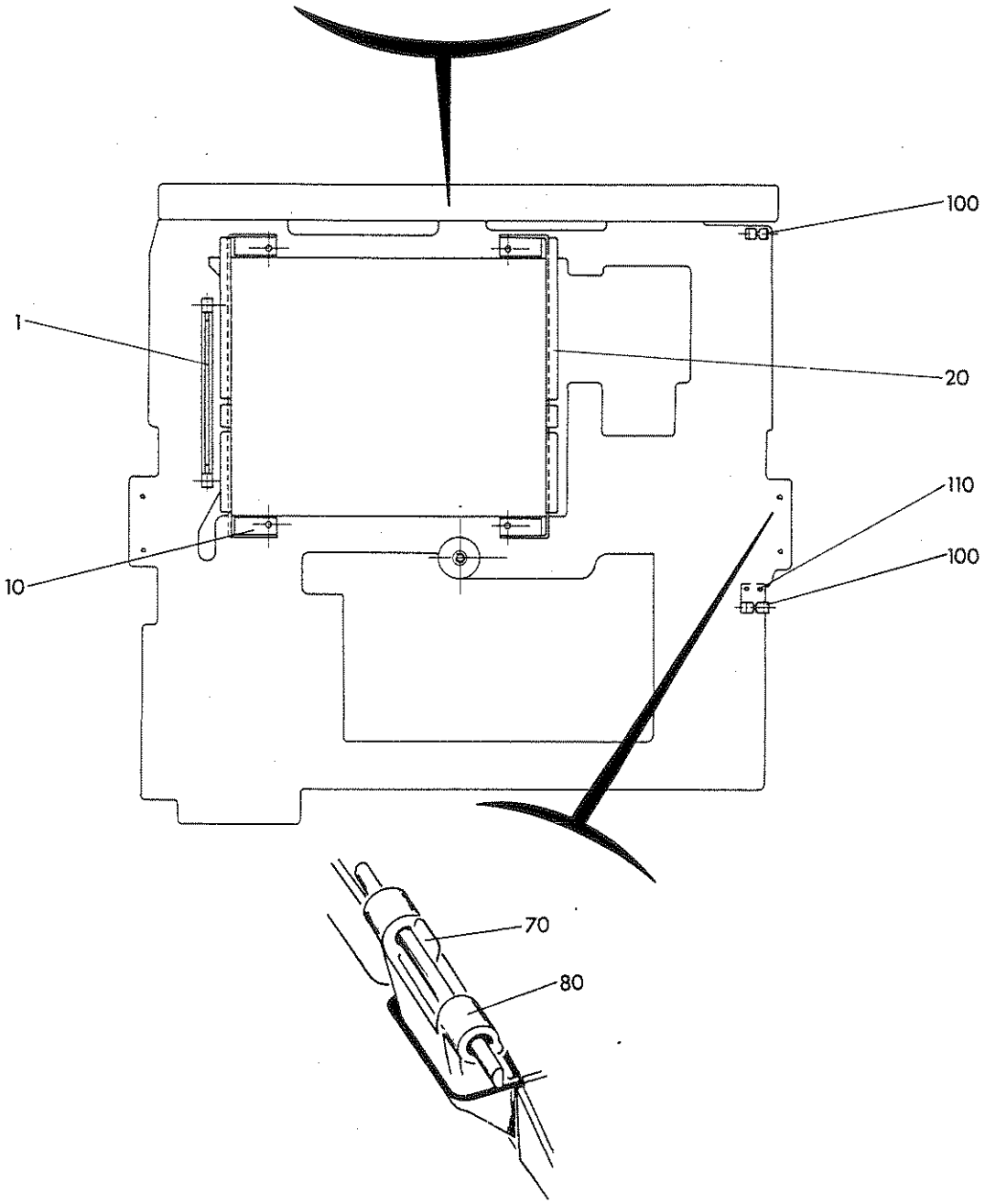


PLATE 33 MAIN BASE

1	2	3 1 2 3 4 5 6 7	4		5
1	23074507-4	GUIDE	23074507-4	53840	01
	15600052-1	SCREW CHC M3X10	E27161-30Q10QVUL	50035	02
	15700257-4	WASHER M3U	E27611M30AAUL	50035	02
10	23074754-4	RIGHT HAND P.B.A. GUIDE	23074754-4	53840	01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
20	23074758-6	LEFT HAND P.B.A. GUIDE	23074758-6	53840	01
	15600050-0	SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
30	23074803-3	RADIATOR ASSEMBLY	23074803-3	53840	01
	15600090-1	SCREW CHC M5X35	E27161-50Q35QVUL	50035	03
	15700258-2	WASHER M5U	E27611M50AAUL	50035	03
40	23074801-2	. COVER	23074801-2	53840	01
50	23074959-3	. SPRING BLADE	23074959-3	53840	02
	15600050-0	. SCREW CHC M3X8	E27161-30Q8QVUL	50035	02
- 60	23076286-9	. LABEL	23076286-9	53840	01
70	23079310-3	LOCKING	23079310-3	53840	02
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	04
	15700257-4	WASHER M3U	E27611M30AAUL	50035	04
80	**********	SUPPORT	**********		02
	15600058-4	SCREW CHC M3X16	E27161-30Q16QVUL	50035	04
	15700257-4	WASHER M3U	E27611M30AAUL	50035	04
- 90	23074978-3	MAIN BASE	23074978-3	53840	01
100	13910537-4	. P.B.A. GUIDE	RC101	51747	02
	15600058-4	. SCREW CHC M3X16	E27161-30Q16QVUL	50035	04
110	23075310-9	. PLATE (DOES NOT EXIST FROM NEW MAIN BASE) ...	23075310-9	53840	01
	15600143-7	. VIS CHC M3X12	E27161-30Q12QVUL	50035	02
	15600052-1	. VIS CHC M3X10	E27161-30Q10QVUL	50035	02

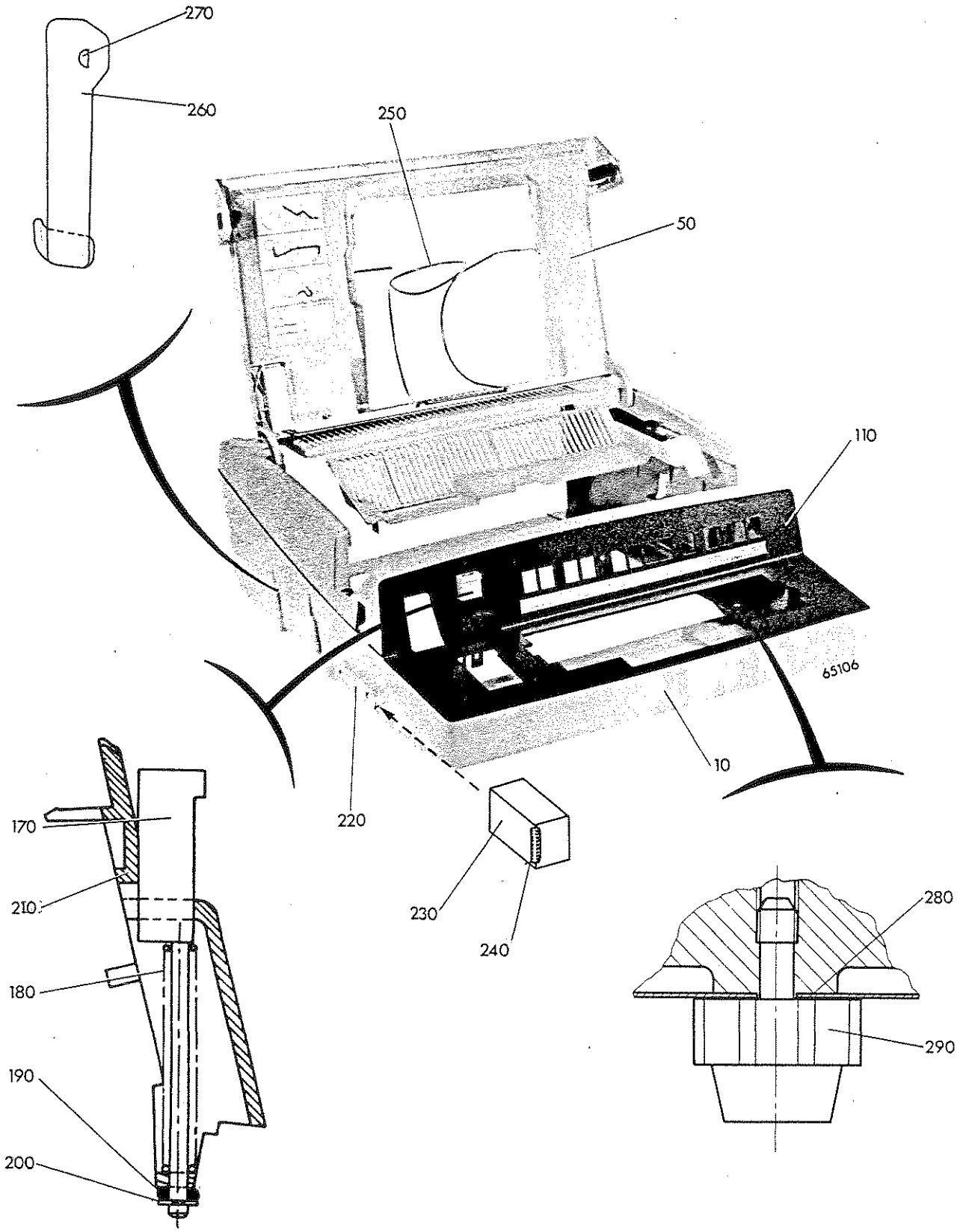


PLATE 34 COVER

ASSEMBLY SUMMARY SHEET

COVER

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
	27	Paint cover with graphite paint	34				
	29	To replace the earth wiring by a fixed one	34				

1	2	3 1 2 3 4 5 6 7	4		5
- 1	23075132-4	PALE BEIGE COVER	23075132-4	53840	01
10	23080096-1	. FITTED BELT	23080096-1	53840	01
- 20	**********	. . RIGHT CLIP	**********		01
- 30	**********	. . LEFT CLIP	**********		01
- 40	**********	. . SLOTTED	**********		01
50	23080098-2	. ASSEMBLED UPPER	23080098-2	53840	01
- 60	**********	. . LOWER COVER	**********		01
- 70	**********	. . COVER PLATE	**********		01
- 80	**********	. . LOCK	**********		02
- 90	**********	. . LOCK PLATE	**********		02
	**********	. . SCREW	**********		02
-100	**********	. . SHAFT	**********		02
110	23075257-9	. DARK BEIGE FITTED FRONT	23075257-9	53840	01
-120	**********	. . FRONT PANEL	**********		01
-130	**********	. . READING LOCK DEVICE	**********		01
-140	**********	. . RIGHT KEYBOARD FIXING	**********		01
-150	**********	. . LEFT KEYBOARD FIXING	**********		01
	15600050-0	. . SCREW CHC M3X8	E27161-30Q8QVUL	50035	06
	15700257-4	. . WASHER M3 AC33	E27611M30AAUL	50035	06
-160	23075247-5	PUNCH BACK SPACER	23075247-5	53840	01
170	23079393-4	. PUNCH BACK SPACER KEY	23079393-4	53840	01
180	23059298-1	. SPRING	23059298-1	53840	01
190	12010002-4	. RING	R1PD501	51254	01
200	12210102-4	. CIRCLIP	23203AM0023T	50297	01
210	23075153-5	. COVER	23075153-5	53840	01
220	23079258-6	SLIDE BAR	23079258-6	53840	01
	15690119-0	PLATE SCREW NO.4-9.5 STEEL	E27131-4P95EDT	50035	02
230	**********	CHAD BOX (SEE PLATE 00 ITEM 70)	**********		PM
240	**********	SPRING (SEE PLATE 00 ITEM 71)	**********		PM
250	23080440-1	PAPER DEFLECTOR	23080440-1	53840	01
260	23080097-4	HANDLE	23080097-4	53840	02
270	23079309-1	SHAFT	23079309-1	53840	02
280	23079299-5	BOTTOM PLATE	23079299-5	53840	01
290	23079289-1	. FOOT	23079289-1	53840	04

ASSEMBLY SUMMARY SHEET

MISCELLANEOUS EQUIPEMENTS

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Serial	Comments
	33	Modification of paper roll spindle					
	83	New material, Improvement of the rigidity					

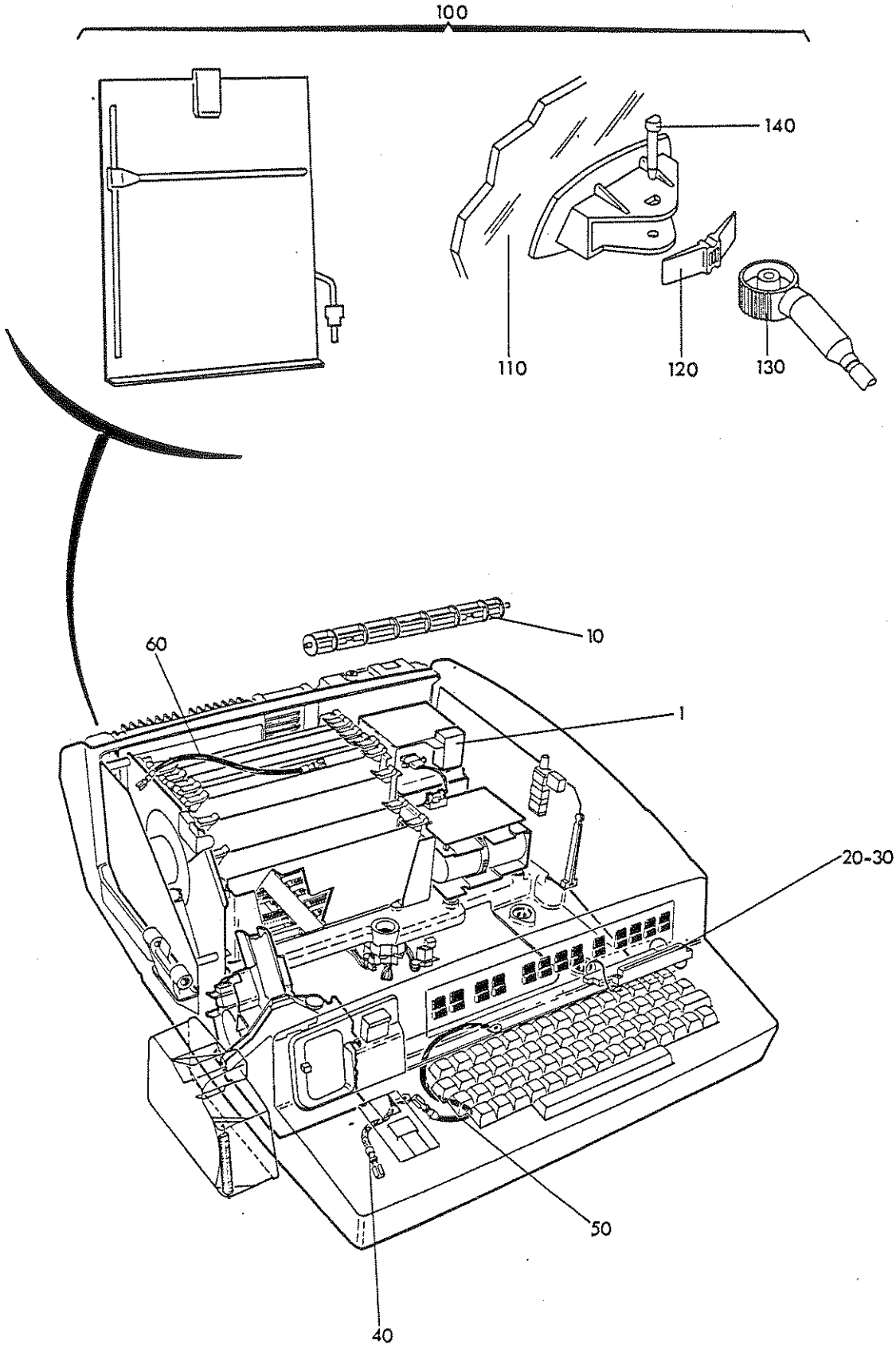


PLATE 35 MISCELLANEOUS EQUIPMENTS
(TELEPRINTER WITHOUT LOGICIAL)

1	2	3 1 2 3 4 5 6 7	4		5
1	23076570-3	COUNTER (OPTIONAL)	23076570-3	53840	01
	15600048-0	SCREW CHC M3X6	E27161-30Q6QVUL	50035	02
	15500225-8	NUT M3	NU503-1	52928	02
10	23079734-6	PAPER ROLL SPINDLE	23079734-6	53840	01
20	23075611-8	WIRING HARNESS KEYBOARDS	23075611-8	53840	01
30	13239217-7	. CONNECTOR (23 PIN)	HE701V23Z	52745	02
40	23075933-3	GROUND CONNECTION (TAPE READER)	23075933-3	53840	01
50	23075934-6	GROUND CONNECTION (MAIN BASE)	23075934-6	53840	01
60	23076956-6	GROUND CONNECTION (DEFLECTOR)	23076956-6	53840	01
- 70	14049961-0	INTEGRATED CIRCUIT (ANSWERBACK PROM) SEE PL.19 .	HM3D7602	54330	01
100	23105959-7	PAPER HOLDER.....	23105959-7	53840	01
110	23116045-7	. PAPER HOLDER.....	23116045-7	53840	01
120	23080048-7	. PRESSOR.....	23080048-7	53840	01
130	23116044-9	. ARM.....	23116044-7	53840	01
140	23080060-1	. PIN.....	23080060-1	53840	01

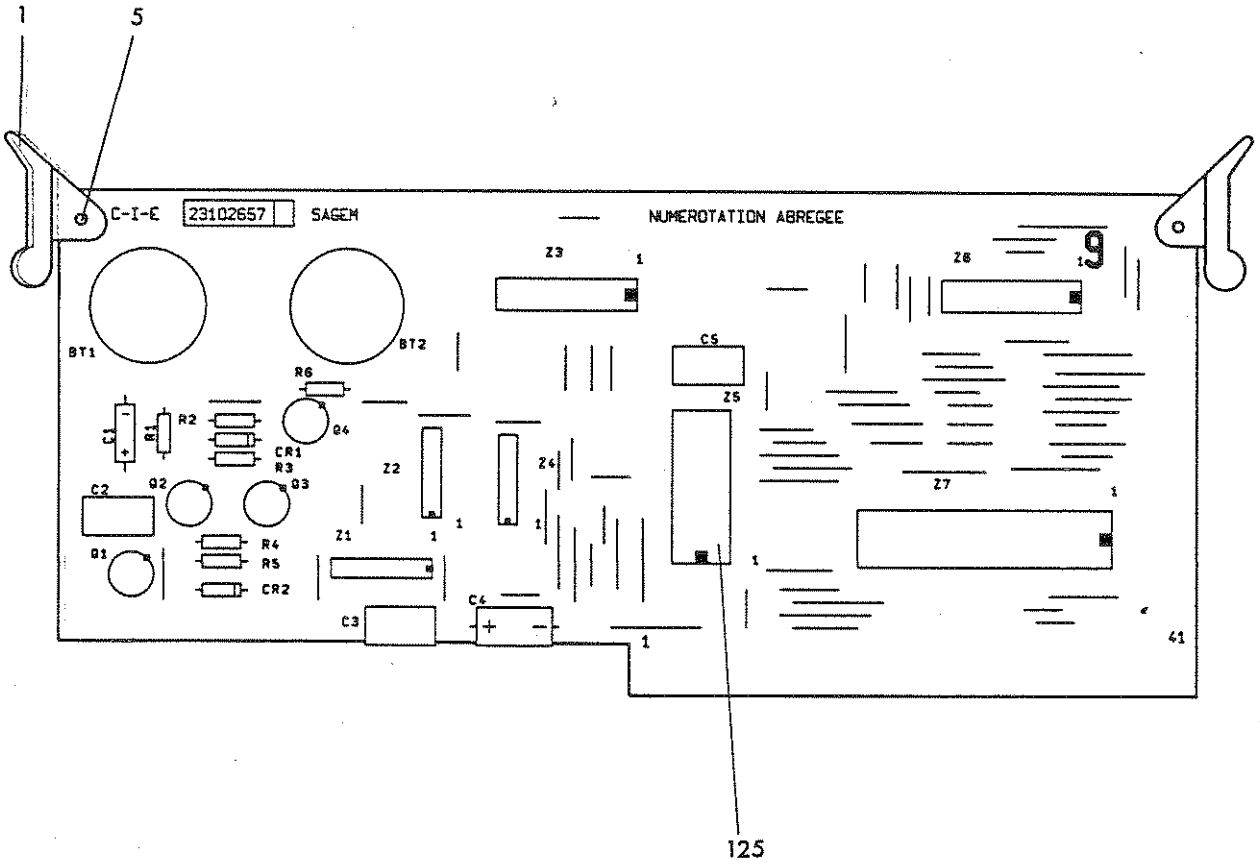


PLATE 36 "NUMEROTATION ABREGEE" BOARD

1	2	3 1 2 3 4 5 6 7	4		5
1	23082278-0	EXTRACTOR	23082278-0	53840	02
5	15850742-4	PIN SPIRAL HDK 3/32X1/4 STEEL	15850742-4	53840	02
10	13510424-8	ACCUMULATOR BT1-BT2	VB10-121730	50023	02
15	14019002-2	DIODE CR1	1N4148	52745	01
20	14018681-2	DIODE CR2	1N4003	10072	01
25	14438265-5	CAPACITOR 20V 2.2MF +-20% C1	CTS13-20V2M2K	52745	01
30	14448436-3	CAPACITOR 250V 0.1MF +-10% C2-C3	222235245104	51956	02
35	14428433-8	CAPACITOR 10V 47MF -10% +100% C4	222201514479	51956	01
40	14448436-3	CAPACITOR 250V 0.1MF +-10% C5	222235245104	51956	01
45	14339123-3	RESISTOR 68 OHMS +-5% 1/4W R1	RC2T68KJ	52745	01
50	14338070-1	RESISTOR 680 KOHMS +-5% 1/4W R2	RC2T680KJ	52745	01
55	14339117-1	RESISTOR 47 KOHMS +-5% 1/4W R3	RC2T47KJ	52745	01
60	14339119-2	RESISTOR 180 KOHMS +-5% 1/4W R4	RC2T180KJ	52745	01
65	14339092-6	RESISTOR 180 OHMS +-5% 1/4W R5	RC2T180UJ	52745	01
70	14338113-9	RESISTOR 22 KOHMS +-5% 1/4W R6	RC2T22KJ	52745	01
75	14039005-2	TRANSISTOR Q1	2N2905A	52745	01
	14099000-5	STANDOFF	EN340	50537	01
80	14038854-9	TRANSISTOR Q2	2N2222A	52745	01
85	14039013-5	TRANSISTOR Q3	2N2907A	52745	01
90	14038854-9	TRANSISTOR Q4	2N2222A	52745	01
	14099025-8	STANDOFF	T018DP	50537	03
95	14049518-8	INTEGRATED CIRCUIT Z1	SFC74LS366AE	99991	01
100	14049352-2	INTEGRATED CIRCUIT Z2	SN7404N	52367	01
105	14048760-2	INTEGRATED CIRCUIT Z3	P5101L1	55626	01
110	14049376-2	INTEGRATED CIRCUIT Z4	SN74LS20N	52367	01
115	14048760-2	INTEGRATED CIRCUIT Z6	P5101L1	55626	01
120	14049838-7	INTEGRATED CIRCUIT Z7	MC6820L	56687	01
125	14099029-0	DIL SOCKET 26 PIN	64-03-61-1	50075	01

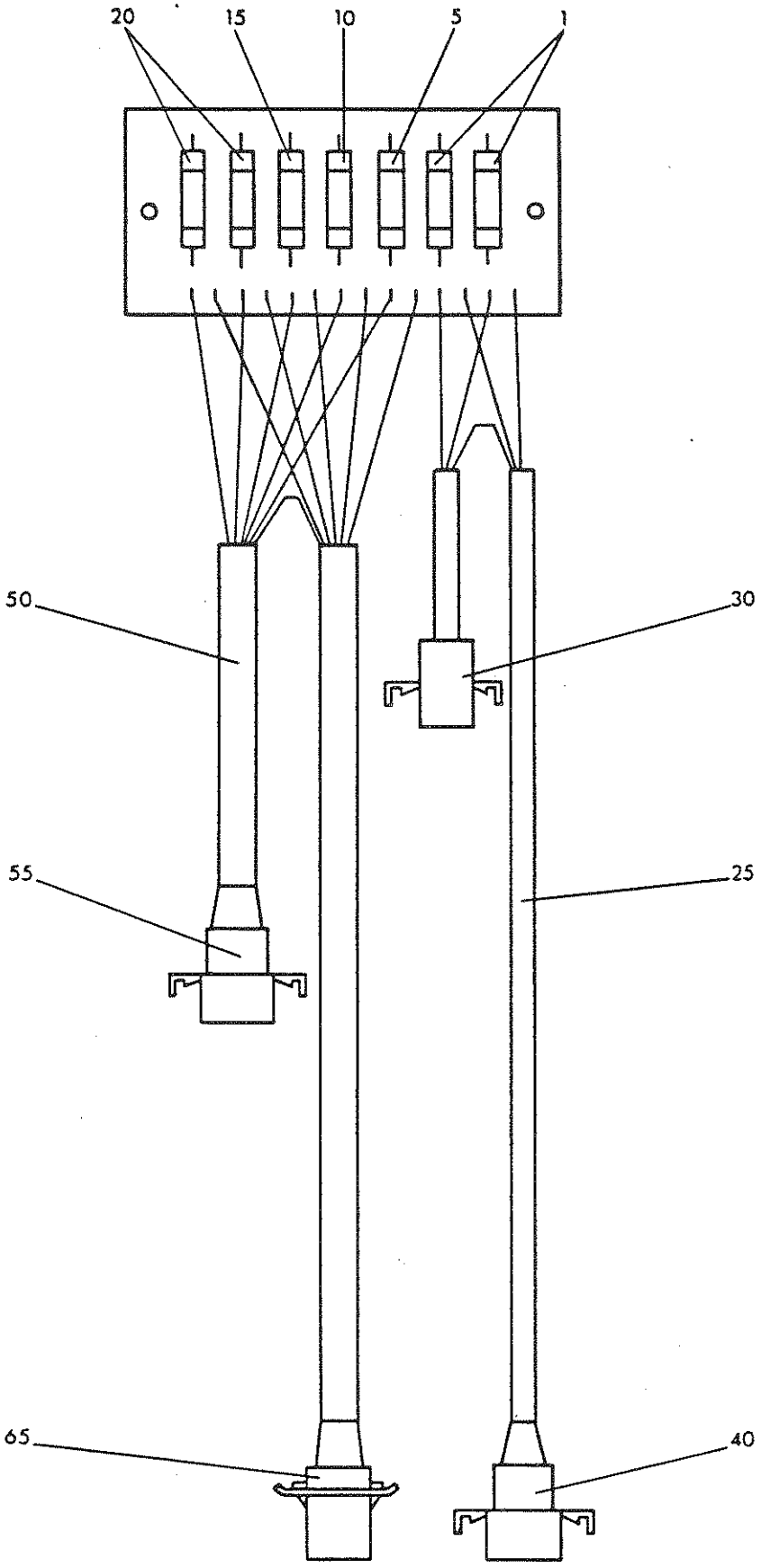


PLATE 37 PROTECTION MODULE

1	2	3 1 2 3 4 5 6 7	4		5
1	23118025-1	FUSE CARTRIDGE 0.31A TD YELLOW	23118025-1	53840	02
5	23118028-5	FUSE CARTRIDGE 2A TD GREEN	23118028-5	53840	01
10	23118026-4	FUSE CARTRIDGE 0.4A TD BLACK	23118026-4	53840	01
15	23118027-2	FUSE CARTRIDGE 0.8A TD BLUE	23118027-2	53840	01
20	23118029-3	FUSE CARTRIDGE 4A TD RED	23118029-3	53840	02
25	23117838-4	WIRING HARNESS FUSES TG	23117838-4	53840	01
30	13233526-3	CONNECTOR (3 PIN)	03-06-1031	59191	01
35	13241327-3	FEMALE CONTACT	02-06-1132	59191	03
40	13233537-0	CONNECTOR (3 PIN)	03-06-2031	59191	01
45	13241328-6	MALE CONTACT	02-06-2132	59191	03
50	23117839-2	WIRING HARNESS FUSE POWER SUPPLY	23117839-2	53850	01
55	13233673-1	CONNECTOR (9 PIN)	03-06-2091	59191	01
60	13241291-6	MALE CONTACT	02-06-2103	59191	09
65	13233718-4	CONNECTOR (9 PIN)	03-06-1091	59191	01
70	13241290-3	FEMALE CONTACT	02-06-1103	59191	09

Assembly Part Number	N° E 890	Variation	Concerned doc. plate N°	Diagram N°	Ind	Machine Sérial	Comments
23075076-3	25	New platen sub-assembly 23074750-2	-				
	40	New sensor 23115293-4	00	23107548-4		52500	
	54	Addition of an uncoupling capacitor at the terminal of each motor	10			4076	
	58	Reference 23058915-8 becomes 23116374-2 (new material)				43500	
	72	Replacement of the platen sub-assembly by a platen moulded around the shaft	8				

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OF

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12140751-3	12 10	01	XL037	07155
12140775-8	14 30	01	80105X1-4	50711
12140784-4	5 230	01	80123X1-4	50711
12210095-7	5 690	01	7555-0040A060T	52499
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	5 60	01		
	11 160	01		
	30 50	02		
	34 200	01		
12210104-5	5 700	01	23203AM0060T	50297
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12210225-8	5 760	01	7555-0060A080T	52499
12210229-0	29 - 5	02	876030-09	51689
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12210233-1	6 100	01	23203AM0040T	50297
	6 170	01		
	11 180	01		
12210234-4	8 30	02	23203AM0070T	50297
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12518047-8	5 770	02	AY6ZZ	50112
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	30 10	01		
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	1 155	01		
	1 160	01		
	1 175	01		
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	20B 75	01		
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	20B 80	01		
	20C 100	01		
	22B 320	01		
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	26B 50	01		
	26B 60	01		
	26C 70	01		
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	26B 1	01		
	26B 20	01		
	26C 15	01		
13236200-9	29 15	01	8140-5017	52270
13238102-0	32 100	09	HE701EV41Y	52745
13238105-4	32 70	01	HE701EV17Z	52745
13238107-5	32 60	07	HE701EV29Z	52745
13239216-9	25A 35	01	850C00ES8-3APN2	52207
13239217-7	35 30	02	HE701V23Z	52745
13239223-9	32 110	01	HE701EV11Y	52745

1	2	3	4	5
13239227-1	31 195	01	HE701EV35Z	52745
13239417-1	25B 35	01	XLR-LNE-32	99995
13241290-3	13A 20	02	02-06-1103	59191
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07155	GOODYEAR TIRE AND RUBBER CO 1144 E MARKET AKRON OH 44316 USA
07538	RCA CORP SOLID STATE DIVISION ROUTE 202 SOMERVILLE NJ 08876 USA
10072	SILEC (STE INDUSTRIELLE DE LIAISONS ELECTRIQUES) SA 64 BD DE MONCEAU 75008 PARIS FRANCE
10092	SILEC (STE INDUSTRIELLE DE LIAISONS ELECTRIQUES) SA 64 BIS RUE DE MONCEAU 75008 PARIS FRANCE
18767	NATIONAL SEMICONDUCTOR CORP 2900 SEMICONDUCTOR DR SANTA CLARA CA 95051 USA
50023	SAFT (STE DES ACCUMULATEURS FIXES ET DE TRACTION) (DPT PILES SAFT LECLANCHE) 156 AVENUE DE METZ 93230 ROMAINVILLE FRANCE
50035	AFNOR (ASSOCIATION FRANCAISE DE NORMALISATION) TOUR EUROPE 92080 PARIS LA DEFENSE CEDEX 7 FRANCE
50060	ATI (ALLIANCE TECHNIQUE INDUSTRIELLE) 134 AVENUE MARCEL CACHIN 92320 CHATILLON FRANCE
50075	AMP DE FRANCE DIV. AMPLIVERSAL 29 CHAUSSEE JULES CESAR 95301 PONTOISE FRANCE
50095	APEX (L'AMORTISSEUR) 4 RUE DUHESME 75018 PARIS FRANCE
50105	S.K.F. CIE D'APPLICATIONS MECANIQUES SA 1 AVENUE NEWTON 92140 CLAMART FRANCE
50112	A.D.R. LES APPLICATIONS DU ROULEMENT 1 AVENUE NEWTON 92140 CLAMART FRANCE
50116	APR (APPAREILLAGE PROFESSIONNEL RADIO ELECTRIQUE) ANCIENS ETS JEAN ROGERO 82270 MONTPEZAT DE QUERCY FRANCE
50297	BNAE (BUREAU DE NORMALISATION DE L'AERONAUTIQUE ET DE L'ESPACE) 8 RUE MOREAU VAUTHIER 92100 BOULOGNE BILLANCOURT FRANCE
50349	PRECIS SA 8 BD DE MENILMONTANT 75020 PARIS FRANCE
50537	COMATEL (COMPTOIR EUROPEEN DE MATERIEL ELECTRONIQUE) SA 26500 BOURG LES VALENCES FRANCE
50614	CROUZET SA 128 AVENUE DE LA REPUBLIQUE 75011 PARIS FRANCE
50711	DOMANGE (ETS) SA 198 AVENUE DES GRESILLONS 92206 ASNIERES FRANCE
50797	SFERNICE (STE FRANCAISE DE L'ELECTRO-RESISTANCE) 59 RUE GUTEMBERG 75737 PARIS CEDEX 15 FRANCE
50850	SEEM (STE D'ETUDES ELECTRO-MECANIQUES) SARL 15 AVENUE VICTOR HUGO 92170 VANVES FRANCE

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50952	FORGOS (ETS) SARL 28 BD BARBES 92120 MONTROUGE FRANCE
51015	GAUTHIER (ETS.J) 75 RUE DE LA VALLEE DU BOIS 92140 CLAMART FRANCE
51148	HEWLETT-PACKARD CO CORPORATE HQ 1501 PAGE MILL RD PALO ALTO CA 94304 USA
51201	INA-ROULEMENTS SA ROUTE DE BITCHE 67501 HAGUENEAU FRANCE
51215	INTERMETALL (DPT SEMI-CONDUCTEURS DE LA STE DES PRODUITS INDUSTRIELS I.T.T.) SA 1 AVENUE LOUIS PASTEUR 92220 BAGNEUX FRANCE
51241	JEANRENAUD (DEPARTEMENT ELECTRO-COMMUTATION) B.P. 359 39105 DOLE FRANCE
51254	LE JOINT FRANCAIS SARL 10 RUE DE LA BAUME 75008 PARIS FRANCE
51350	L.C.C.-C.I.C.E. (CIE EUROPEENNE DE COMPOSANTS ELECTRONIQUES) SA 36 AVENUE GALLIENI 93170 BAGNOLET FRANCE
51464	MANUFACTURE FRANCAISE D'OEILLETS METALLIQUES SA 5 RUE DE DUNKERQUE 75010 PARIS FRANCE
51530	MECANINDUS (STE) 54 RUE LOUIS BLANC 92400 COURBEVOIE FRANCE
51596	MICRO SA BOULEVARD DE BORD DE MER PRINCIPAUTE DE MONACO
51689	NOMEL (NOUVEAUTES MECANIQUES ELECTRIQUES) TOUR FRANKLIN CEDEX 11 92081 PARIS LA DEFENSE FRANCE
51717	OHMIC SARL 69 RUE ARCHEREAU 75019 PARIS FRANCE
51747	OEC (OUEST ELECTRONIC CONNECTEURS) SA 5 RUE DE LA FAUVETTE 95102 ARGENTEUIL FRANCE
51918	PRONER (ETS) SA B.P.31 93160 NOISY LE GRAND FRANCE
51950	RADIAL SA 101 RUE PHILIBERT HOFFMANN Z.I. 93110 ROSNY SOUS BOIS FRANCE
51956	R.T.C. LA RADIOTECHNIQUE COUPELEC SA DIV RESISTANCES ET CONDENSATEURS 51 RUE CARNOT 92150 SURESNES FRANCE
52116	SECME (STE D'ETUDES ET DE CONSTRUCTION DE MATERIEL ELECTRONIQUE) SA 88 AVENUE GALLIENI 93170 BAGNOLET FRANCE
52169	SIC-SAFCO (LES CONDENSATEURS) SA 91 RUE DE BELLEVUE 92704 COLOMBES FRANCE
52172	SIEMENS SA DIVISION COMPOSANTS ELECTRONIQUES 39-47 BOULEVARD D'ORNANO 93200 SAINT-DENIS FRANCE
52183	SSC SILICIUM SEMICONDUCTEUR SA 45 RUE DE MONCEAU 75008 PARIS FRANCE

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52207	SOCAPEX SA 9 RUE EDOUARD NIEUPORT 92153 SURESNES FRANCE
52270	SOURIAU ET CIE SA DIVISION CONNEXION ET SPATIAL 13 RUE DU GENERAL GALLIENI 92130 BOULOGNE BILLANCOURT FRANCE
52274	SOVCOR ELECTRONIQUE SA 11 CHEMIN DE RONDE 78110 LE VESINET FRANCE
52310	SES (STE ELECTRIQUE STERLING) 1 RUE DELEMONT 68300 SAINT-LOUIS FRANCE
52367	TEXAS INSTRUMENTS - FRANCE SA 06270 VILLENEUVE LOUBET FRANCE
52412	TRELEC SARL 2 RUE DE L'AGRICULTURE 95110 SANNOIS FRANCE
52450	U.M.D. (USINE METALLURGIQUE DOLOISE) SA 92 AVENUE DE GRAY 39100 DOLE FRANCE
52483	VIBRACHOC SA 216 BUREAUX DE LA COLLINE 92213 SAINT-CLOUD FRANCE
52499	VIRAX SA B.P. 197 51321 EPERNAY FRANCE
52745	UTE (UNION TECHNIQUE DE L'ELECTRICITE) CCTU (COMITE DE NORMALISATION DU COMITE DE COORDINATION DES TELECOMMUNICATIONS) 12 PLACE DES ETATS UNIS 75783 PARIS CEDEX 16 FRANCE
52746	ACCEL (ACCESSOIRES ELECTRONIQUES) SA 35 RUE DE LA MARE 75020 PARIS FRANCE
52842	GEDELEC (STE) SA 92 AV MARGUERITE RENAUDIN 92140 CLAMART FRANCE
52928	RAPID SA 45 RUE DES DEUX GARES 92504 RUEIL-MALMAISON FRANCE
53072	EUROFARAD SA 92 RUE OBERKAMPF 75011 PARIS FRANCE
53127	HELLERMANN FRANCE SA 34 RUE GAETAN LAMY TOUSSUS LE NOBLE 75530 BUC FRANCE
53555	C.E.P.E. (CIE DIELECTRONIQUE ET DE PIEZO-ELECTRICITE) SA 101 RUE DU PRESIDENT ROOSEVELT 78500 SARTROUVILLE FRANCE
53573	LOUPOT-CIE (ETS J.) SA ROUTE DE CONCARNEAU 29000 QUIMPER FRANCE
53735	SAVIGNY SA 938 AVENUE SAINT-JUST 77530 VAUX LE PENIL FRANCE
53840	SAGEM SA (STE D'APPLICATIONS GENERALES D'ELECTRICITE ET DE MECANIQUE) 6 AVENUE D'IENA 75783 PARIS CEDEX 16 FRANCE
54330	HARRIS MFG CO INC ST LOUIS MO USA
54479	MATEL SA 21 AVENUE DU CLOS 94210 LA VARENNE ST. HILAIRE FRANCE
54515	CLAIRE INTERNATIONAL NV OVERHAAMLAAN 3700 TONGEREN BELGIQUE
54636	CELDUC (CONSTRUCTION ELECTRIQUE DU CENTRE) SA 42290 SORBIERS FRANCE

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55242	COMEPA 34 RUE JACQUART 93500 PANTIN FRANCE
55303	ARNOULD ELECTRO INDUSTRIE 62 BIS AVENUE GABRIEL PERI 93407 SAINT-OUEN FRANCE
55326	GENERAL ELECTRIC SEMICONDUCTOR PRODUCT DEPARTEMENT ELECTRONICS PARK SYRACUSE NY 13221 USA
55361	MILTON ROSS (STE FRANCAISE FACTORING) 23 RUE SAINT-DOMINIQUE 75007 PARIS FRANCE
55513	CLO ELECTRONIQUE SARL 31 BIS RUE TRAVERSIERE 92100 BOULOGNE-BILLANCOURT FRANCE
55578	WEIDMULLER-FRANCE SARL 11 RUE EDOUARD BRANLY ZAE 95220 HERBLAY FRANCE
55626	INTEL FRANCE 74 RUE D'ARCUEIL 94528 RUNGIS CEDEX FRANCE
55863	ANALOG DEVICES INC PO BOX 280 81 INDUSTRIAL WAY NORWOOD MA 02062 USA
56184	METAFIX (STE) SA RUE EUGENE GAZEAU 60300 SENLIS FRANCE
56687	MOTOROLA INC SEMICONDUCTOR PRODUCTS DIV PO BOX 20923 5005 E MCDOWELL RD PHOENIX AZ 85036 USA
56876	TEKELEC-AIRTRONIC B.P.2 92310 SEVRES FRANCE
57249	RIFA SA BOULEVARD DE LA LIANE 62206 BOULOGNE SUR MER FRANCE
57269	MILLERIOUX ET CIE (ETS P.) (STE DE TRANSFORMATEURS ET SELFS) 187 ROUTE DE NOISY LE SEC 93230 ROMAINVILLE FRANCE
58314	PORTESCAP FRANCE 28 RUE BRUNEL 75017 PARIS FRANCE
58852	MOSTEK FRANCE 30 RUE DU MORVAN SIL TC 471 94613 RUNGIS CEDEX FRANCE
59191	FRANCE CONNEXION SARL 14 RUE DE FONTENAY 94300 VINCENNES FRANCE
59582	AMI MICROSYSTEMS 124 AVENUE DE PARIS 94300 VINCENNES FRANCE
59705	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV 464 ELLIS ST MOUNTAIN VIEW CA 94042 USA
99984	WIELAND. F ELEKTRO-INDUSTRIE-GMBH BRENNERSTRASSE 10-14, 8600 BAMBERG RFA
99985	DUBILIER ELECTRONICS CHAUCER TRADING ESTATE LAUNTON ROAD BICESTER OXON DX6 OTU UNITED KINGDOM
99986	TISCO-FRANCE LA BOUSIDIERE -BLOC.A-R.N.186 92350 LE PLESSIS-ROBINSON FRANCE
99987	ALLEN-BRADLEY CO 1201 SOUTH 2ND ST MILWAUKEE WI53204 USA
99988	ALLEN-BRADLEY ELECTRONICS LTD PILGRIMS WAY BEDE IND ESTATE JARROW TYNE ET WEAR NE32 3EN UNITED KINGDOM

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99989	DIN DEUTSCHES INSTITUT FUER NORMUNG E.V., KAMEKESTRASSE 2-8 5000 KOELN RFA		
99990	GENERAL INSTRUMENT CORP SEMICONDUCTOR PRODUCTS GROUP PO BOX 600 600 W JOHN ST HICKSVILLE NY 11802 USA		
99991	THOMSON-CSF (STE) DIV. SEMICONDUCTEURS SESCOSEM 173 BD HAUSSMANN 75360 PARIS CEDEX 08 FRANCE		
99992	SPECTROL ELECTRONICS CORP 17070 E GALE AVE CITY OF INDUSTRY CA 91745 USA		
99993	ELEC-TROL 26477 NORTH GOLDEN VALLEY ROAD SANGUS CALIFORNIA 91350 USA		
99994	LEGRAND (STE) SA 128 AVE MARECHAL DE LATTRE DE TASSIGNY 87011 LIMOGES CEDEX FRANCE		
99995	ITT CANNON ELECTRIC 666 E DYER RD SANTA ANA CA 92702 USA		
99996	SCHURTER AG H WERKHOFSTER 8 CH 6002 LUZERN LU SUISSE		
99997	SGS UNITED KINGDOM LTD PLANAR HOUSE WALTON STREET AYLESBURY BUCKS UNITED KINGDOM		
99998	S.S.S. (SOLID STATE SCIENTIFIC, INC.) MONTGOMERYVILLE INDUSTRIAL CENTER MONTGOMERYVILLE PA 18936 USA		
99999	SCHNORR, ADOLF, KG 7434 MAICHINGEN STUTTGARTER STRASSE RFA		

TELEPRINTER TX 20
UTILIZATION MANUAL

SAGEM

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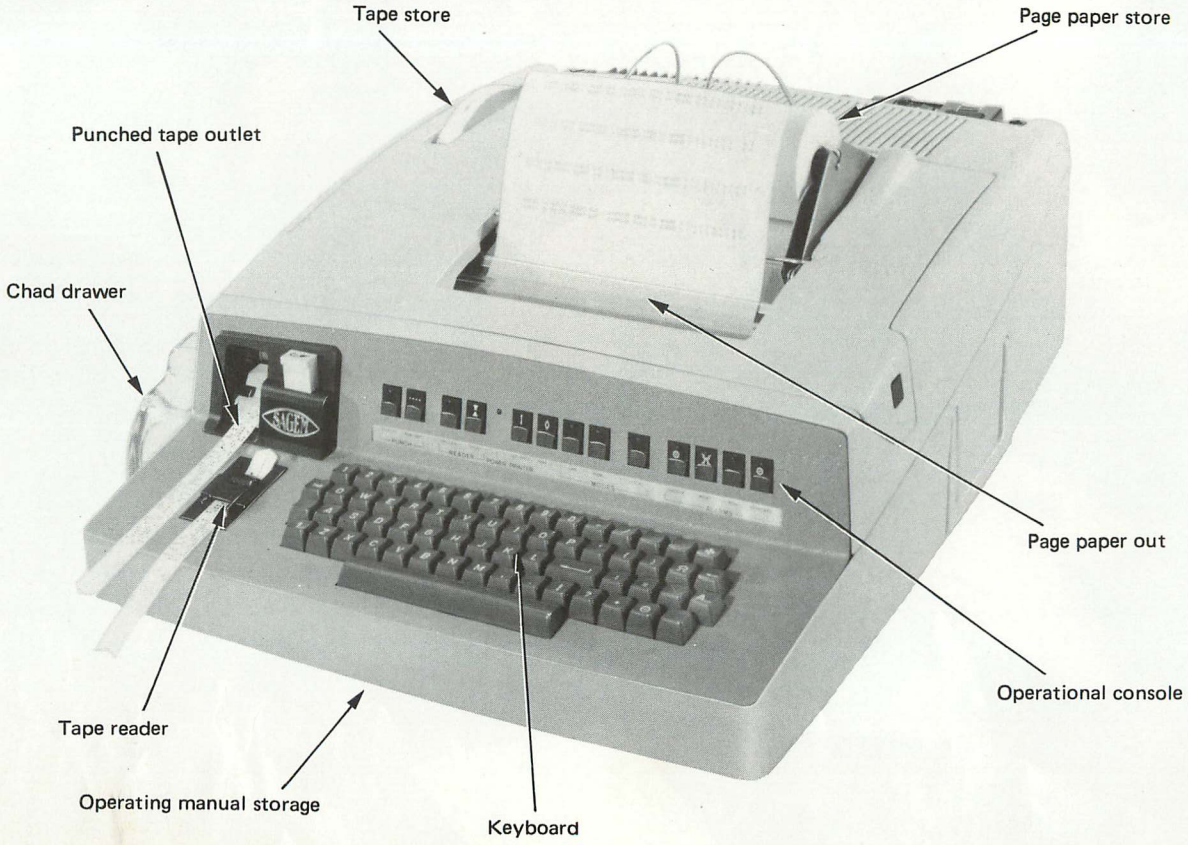
2 your TX 20 teleprinter

It resembles a typewriter but has many additional possibilities.



printing

Three printing patterns enable the following to be distinguished either on the original or on the copies :

– a message prepared locally,

A LOCALLY PREPARED MESSAGE IS PRINTED IN CHARACTERS
SLANTING TO THE LEFT
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

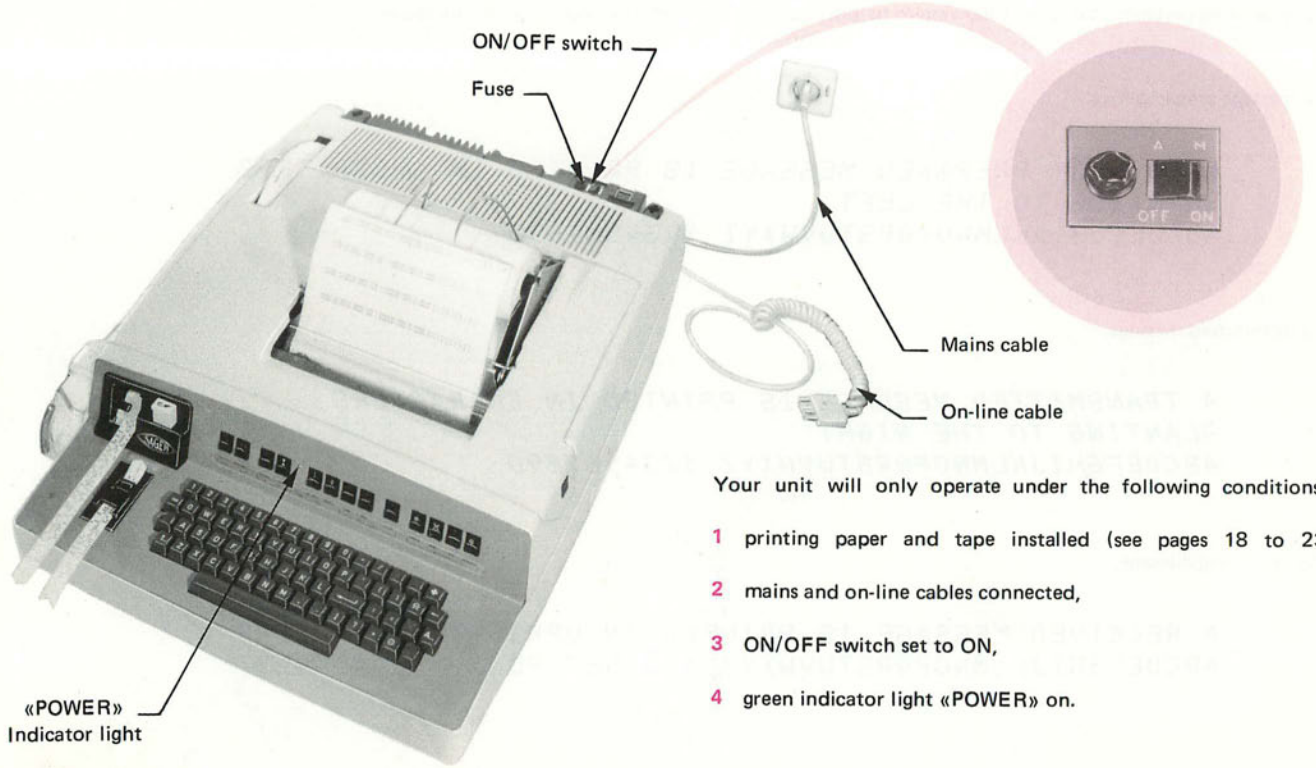
– a transmitted message,

A TRANSMITTED MESSAGE IS PRINTED IN CHARACTERS
SLANTING TO THE RIGHT
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

– an incoming message,

A RECEIVED MESSAGE IS PRINTED IN UPRIGHT CHARACTERS
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

4 starting your TX 20 teleprinter



Your unit will only operate under the following conditions :

1 printing paper and tape installed (see pages 18 to 23),

2 mains and on-line cables connected,

3 ON/OFF switch set to ON,

4 green indicator light «POWER» on.

NOTE : Check the position of the maintenance switch (see page 29).

The printing device automatically positions itself at the beginning of a line and your teleprinter is now in «STAND BY» condition.

keyboard

Repetition

Do you want to repeat a character ? Keep the corresponding key depressed. The character is printed once, then, after one second, it is repeated as long as the key is depressed.

Particular keys

- LETTERS shift
- 32nd combination of No 2 CCITT code
- FIGURES shift
- LINE FEED
- CARRIAGE RETURN
- CORRESPONDENT'S ANSWER-BACK CODE REQUEST (NOTE 1)
- TABULATION (See corresponding paragraph)
- CALL BELL (NOTE 2)
- NEW LINE (NOTE 3)
- OPTION

Characters for national use

F G H

(in FIGURES position)

É % H

F, G, H codes in FIGURES position are the characters used in FRENCH network.

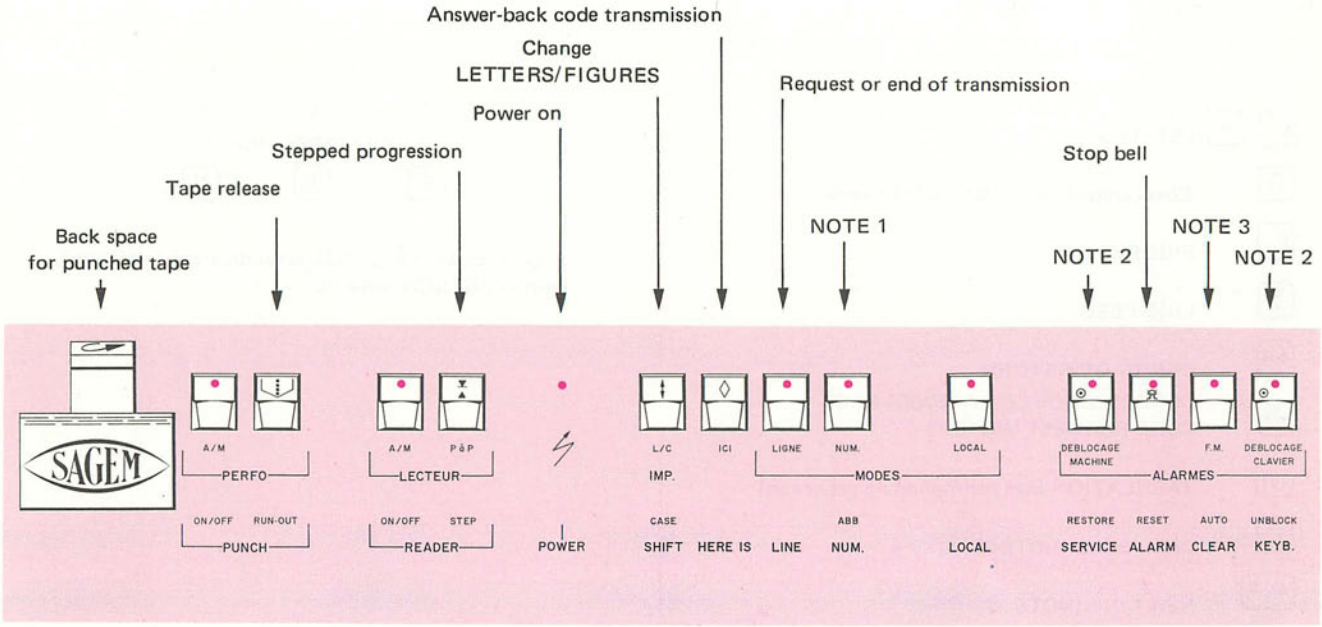
NOTE 1 : When your unit is connected to a correspondent, depressing this key automatically causes correspondent's answer-back code to be transmitted.

NOTE 2 : When your unit is connected to a correspondent, depressing this key causes correspondent's audio-alarm to ring.

NOTE 3 : Depressing this key causes the printing device to return to the beginning of the next line.

6 operational console

Associated indicator lights indicate the operating conditions of your unit.



Light on = ON
Light off = OFF

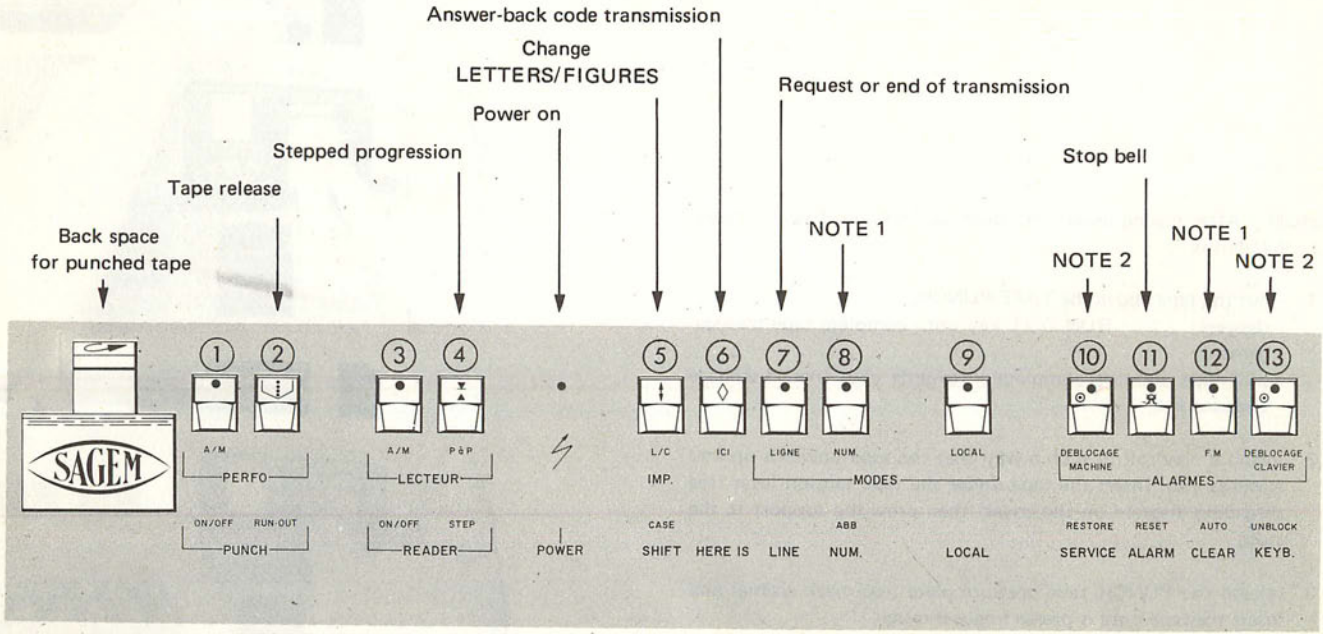
NOTE 1
Abbreviated numbering (see corresponding paragraph) This key can be used for another optional function.

NOTE 2
Indicator light on= locking. Clear by depressing key (light goes out).

NOTE 3
Automatic end of message (see corresponding paragraph).
This key can be used for another optional function.

6 operational console

Associated indicator lights indicate the operating conditions of your unit.



NOTE 1
These keys are reserved for optional functions.

NOTE 2
Indicator light on= locking.
Clear by depressing key (light goes out).

Light on = ON
Light off = OFF

how to receive a message ?

This is completely automatic. During the entire transmission the LINE key indicator light is illuminated.

how to send a message ?

With unit on STAND BY depress LINE key. The associated indicator light begins to blink until CALL CONFIRMATION (at which time light remains on). If the line is busy, the indicator goes out.

With LINE light illuminated, compose CORRESPONDENT CALL NUMBER on the KEYBOARD.

After establishing communications, you can send your MESSAGE on the KEYBOARD.

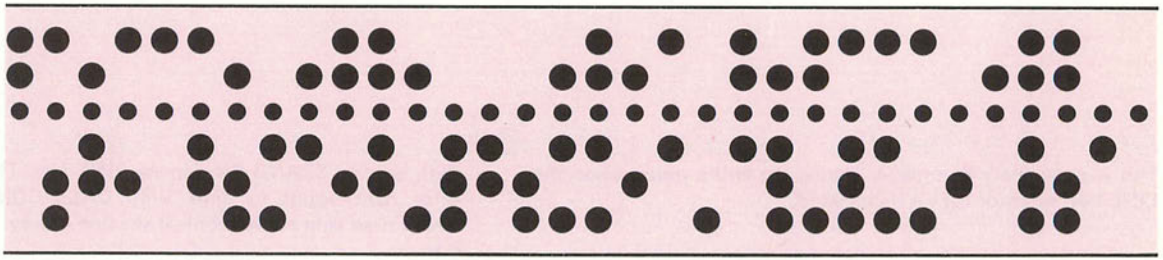
When finished, depress the LINE key again. The associated indicator light blinks until reception of END OF MESSAGE CONFIRMATION at which time the indicator light goes out. Your COMMUNICATION is then DISCONNECTED.

If your correspondent's unit has a derangement during the communication, your teleprinter will write you «DER» and the communication will be cut.

8 the punched tape

What is the punched tape ? Its use ?

The punched tape enables you to keep the message you will have typed out at the most convenient time. You then will be able to transmit it later without any more waiting time, any mistake or... new typing.



* LETTERS A...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	←	⇟	* A...	1...	→	
FIGURES 1...	–	?	:	✠	3				8	Ω	(	)	·	,	9	0	1	4	'	5	7	=	2	/	6	+						
Combinations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

Note : The character ✠ can be not punched.

In FIGURES position, the 6, 7 and 8 combinations are devoted to national use (See KEYBOARD paragraph).

*The «LETTERS» symbol can be showed by «A...» or « ⊕ ».

how to prepare a message locally on punched tape for later transmission ?

With your unit on STAND BY :

1 depress LOCAL key. LOCAL indicator light comes on. PUNCH ON/OFF indicator comes on or remains on (see page 27),

2 depress key ⌴ (RUN-OUT), the tape punch starts automatically, pull free several centimeters of punched tape. These will be useful for later threading on the READER,

3 prepare your message on punched tape using the KEYBOARD. Begin every message by depressing keys LETTERS and ↵ NEW LINE,

4 when your message is completed, again free several centimeters of blank tape by depressing ⌴ key,

5 depress LOCAL key. Associated indicator light goes out. PUNCH ON/OFF indicator light then returns to its original condition.

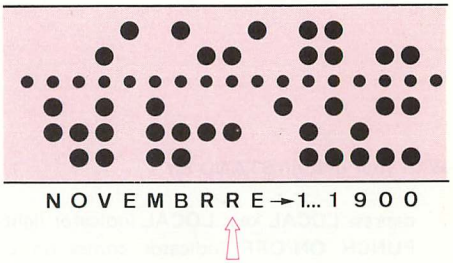
10

how to correct a " typing error " while preparing a message on punched tape ?

If a punched tape contains an error :

NOVEMBRRE 1900

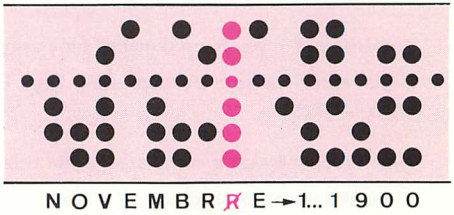
Eliminate one R on the punched tape as follows :



1 depress [⟲] key as many times as necessary to cause the BACK SPACE of the punched tape up to the erroneous character ; on this example 8 times for combinations 0, 0, 9, 1, 1 ..., SPACE (⟶), E, R. FIGURES (1 ...) combination has been automatically composed by the unit,

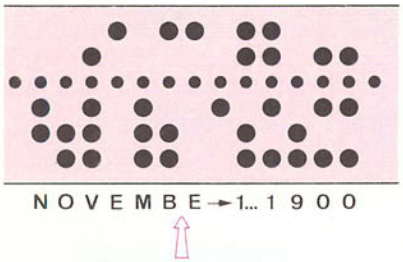
2 depress LETTERS key in order to delete the erroneous character combination,

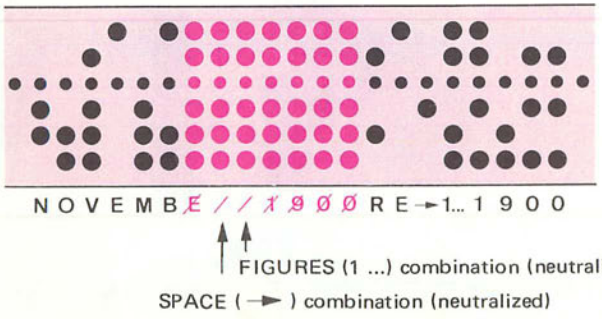
3 depress 32nd COMBINATION [⊖] key as often as required to advance the punched tape ; in this example 7 times.



The text will then correctly appear when the corrected tape will be read :

NOVEMBRE 1900





If a punched tape now contains another error :

NOVEMBE 1900

Add an R to the punched tape as follows :

1 proceed as in 1 on the preceding page, this time with 7 BACK SPACES for combinations 0, 0, 9, 1, 1 ..., SPACE (→), E,

2 depress LETTERS key as many times as you have depressed the BACK SPACER key in order to neutralize the characters. in this example 7 times,

3 type text again beginning with the character to be corrected : it will be correctly punched. In this example type R, E, SPACE (→), 1, 9, 0, 0. FIGURES (1 ...) combination is automatically composed by the unit.

The text will then correctly appear when the corrected tape will be read :

NOVEMBRE 1900

Note : Avoid making corrections requiring more than 10 BACK SPACES.

12 the tape reader

The READER allows you to :

- «read» a message by printing it on the paper page of the teleprinter (see page 13) to check for errors,
- automatically transmit a message to a correspondent after having carried out the CALL procedure.

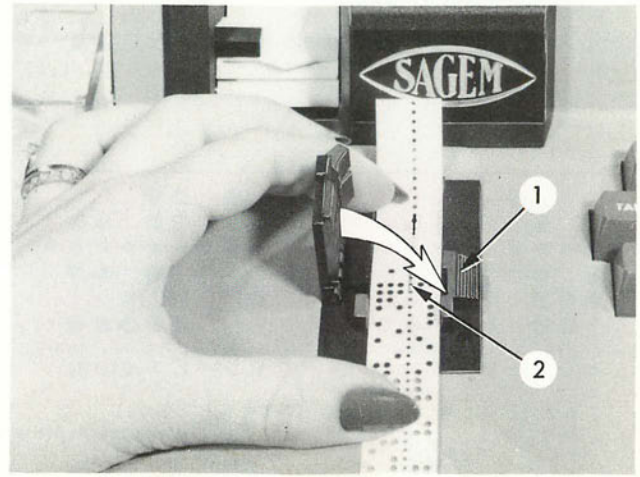
how to place the punched tape on the reader ?

Follow the steps as shown on the adjacent photo :

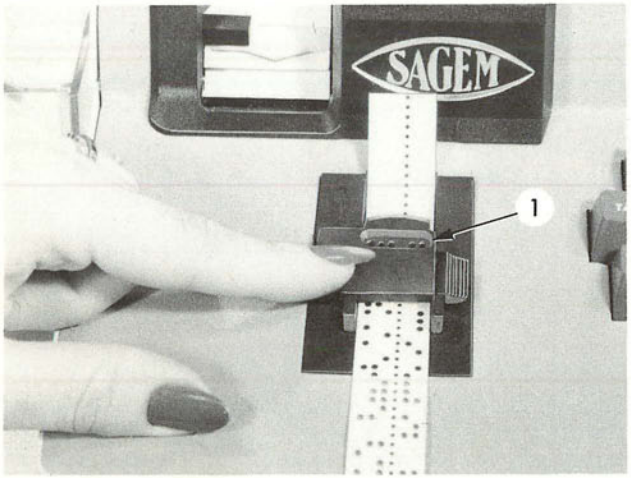
1 open the tape contact plate by pressing on lock (1) ,

2 position the tape in such a way that the arrow printed on the tape and the arrow engraved on the reader are oriented in the same direction.
Correctly position the punched tape on the drive sprocket (2) ,

3 press down the pressure plate. It locks automatically.



how to " read " a punched tape ?



With the unit on STAND BY depress LOCAL key. The associated indicator light comes on.

In order to duplicate the punched tape with your TAPE PUNCH, your PUNCH ON/OFF indicator light must be on (see page 27).

Place the punched tape on the READER then depress READER ON/OFF key. The message contained on the punched tape is then printed.

READER operation is automatically ended at the end of the punched tape, or by yourself, by depressing again READER ON/OFF key.

You can read the punched tape STEP-BY-STEP (read character-by-character) by depressing the STEP key.

An aperture (1) provided in the pressure plate allows you to «read» the character which will be printed when the STEP key is depressed again.

When reading the punched tape is finished, depress the LOCAL key. The associated indicator light will go out.

how to transmit a message using the tape reader ?

The equipment being in STAND BY mode, put the tape to be transmitted on to the TAPE READER.

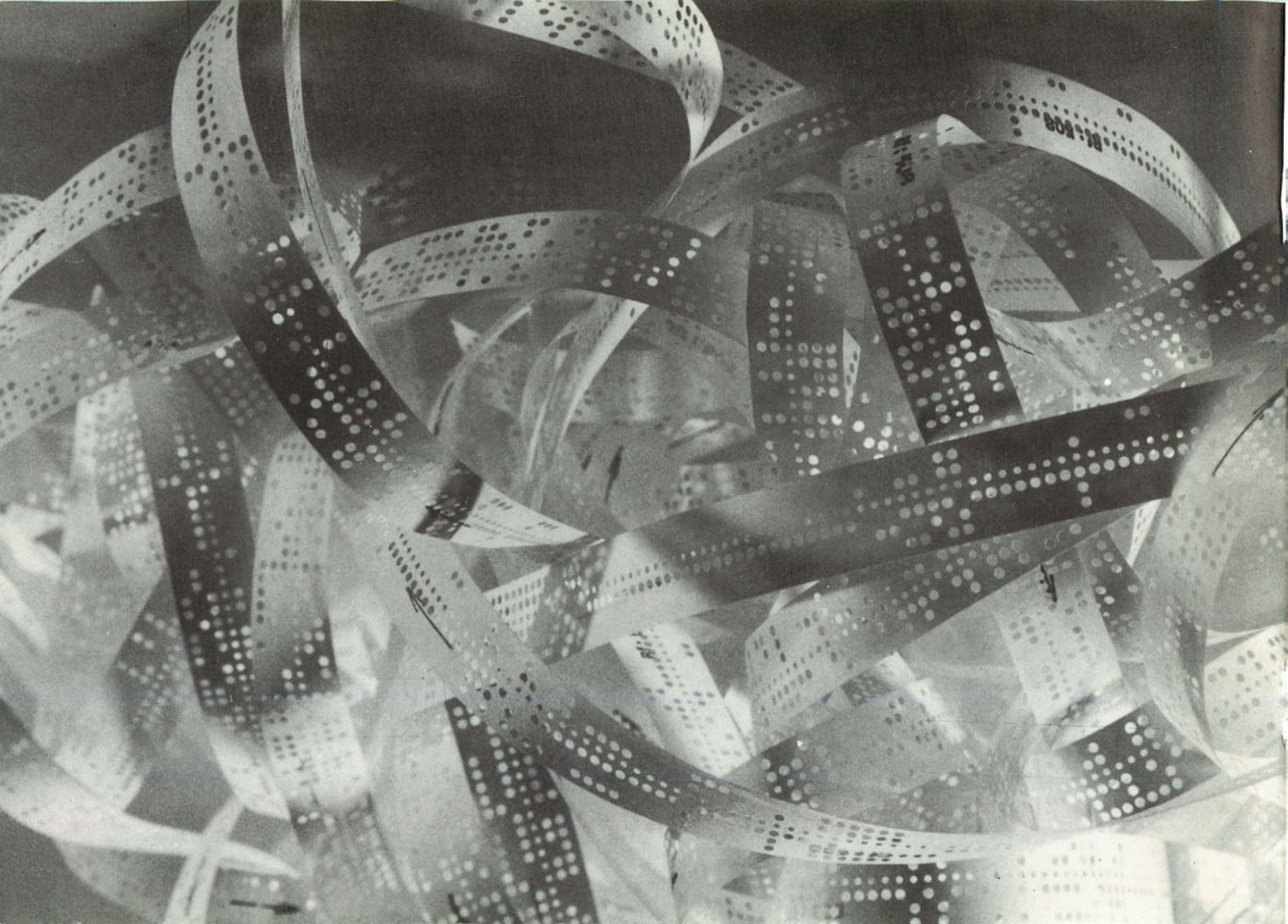
When you are linked with your correspondent, depress READER ON/OFF key. The associated indicator light comes on.

The message is then automatically transmitted.

When the tape reading is finished, the TAPE READER stops and its associated indicator light goes off.

Depress LINE key to end communication.

This possibility decreases to a minimum the line in use time and therefore reduces your operating costs.



16 receipt of an incoming call during message preparation

You are preparing your message on the KEYBOARD, the text prints slanted to the left. A CALL appears, indicator light for LINE key illuminates and the associated LOCAL key indicator light goes out. The associated indicator light for PUNCH ON/OFF key remains on or extinguishes (see page 27). The printout of your message, which is occuring, stops. The incoming message for the line is printed upright and is punched if the PUNCH ON/OFF indicator light is on.

If the PUNCH ON/OFF indicator light is extinguished at the time of this reception, and if you wish, after establishing communication :

- you can continue to prepare your message «blind» with the KEYBOARD and TAPE PUNCH after having depressed a 2nd time the LOCAL key (associated indicator light comes on). Automatically, the TAPE PUNCH is available for use (associated indicator light for the PUNCH ON/OFF key comes on).

- you can communicate with your correspondent after having depressed the LOCAL key which stops your TAPE PUNCH and allows you to use your KEYBOARD «on line». The associated indicator lights for LOCAL and PUNCH ON/OFF keys extinguish. The text that you type on the KEYBOARD prints slanted to the right.

If the PUNCH ON/OFF indicator light is ON during this reception and if you wish, after establishing communication :

- you can continue to prepare your message «blind» using the KEYBOARD and TAPE PUNCH after having depressed LOCAL and PUNCH ON/OFF keys (associated indicator lights come on). The TAPE PUNCH is then automatically available for your use.

- you can communicate with your correspondent using the KEYBOARD after communication have been established.

Depress UNBLOCK KEYB. key if the associated indicator light is ON.

preparation of a message while transmitting another message

Briefly, operational simplicity of your unit allows you to send a message with the READER and to simultaneously prepare a second message «blind» on punched tape as follows :

- carry out the transmission operation using the READER,
- depress LOCAL key. The TAPE PUNCH begins to operate (associated lights come on), (See page 27),
- prepare your message using the KEYBOARD and TAPE PUNCH.

- You can terminate the preparation of the second message before the end of the first : depress LOCAL key. Associated indicator lights for LOCAL and PUNCH ON/OFF keys extinguished. READER remains operational and the corresponding transmitted message text is printed slanted to the right. Associated indicator light for LINE key is on.

- You can terminate preparation of the second message before the end of the first : the READER automatically stops at the end of the punched tape. Depress LINE key, the associated indicator light goes out. The associated lights for PUNCH ON/OFF and LOCAL are illuminated. The text typed on the KEYBOARD is printed with the characters slanted to the left.

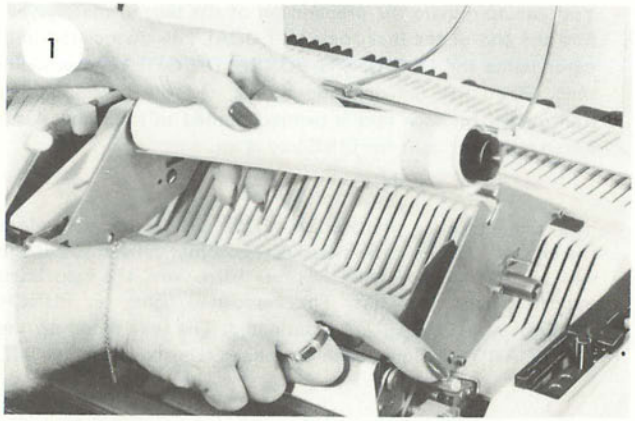
controls for correspondent's machine (optional)

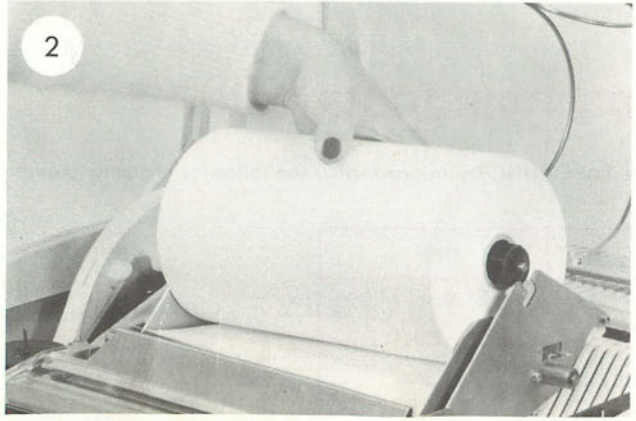
You can control the stop or start of your correspondent's READER or TAPE PUNCH (optional) using the following character groups :

	ON	OFF
READER	L L L L	
PUNCH	C C C C	F F F F

← Optional character group

18 loading your teleprinter with page paper





WHEN ? Check that the paper supply is adequate. Nevertheless, your teleprinter will communicate to you by printing «PAPER OUT», then goes to LOCKING mode (indicator light and audio alarm come on), the printing device positions itself to the extreme left.

At the end of the week ensure that your teleprinter is re-supplied with sufficient paper.

HOW ? Stop the audio alarm by depressing the RESET ALARM key. Raise the cover lid and follow instructions as shown on the photos :

1 move the control lever for the paper press towards you, completely unwind the remaining paper and remove the used roll ; then, extract the shaft from the latter and place it on the new roll ;

2 install the assembly on its brackets, the paper should unwind down and towards you.

3 insert the paper in its rack, in front of the pressure shaft, and behind the drive roller, then under the paper cutter (See diagram for threading under the cover),

4 pull the paper and bring the paper edged parallel to the roller margins, then move the control lever for the paper press towards the rear of the unit.

Depress RESTORE SERVICE key, then LOCAL key. The RESTORE SERVICE associated light extinguishes and the one associated with LOCAL illuminates.

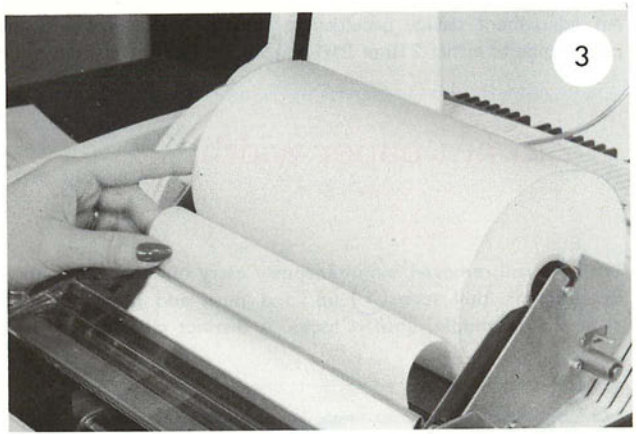
Disengage several pages of paper by depressing [⇟] key in order to ensure correct unwinding.

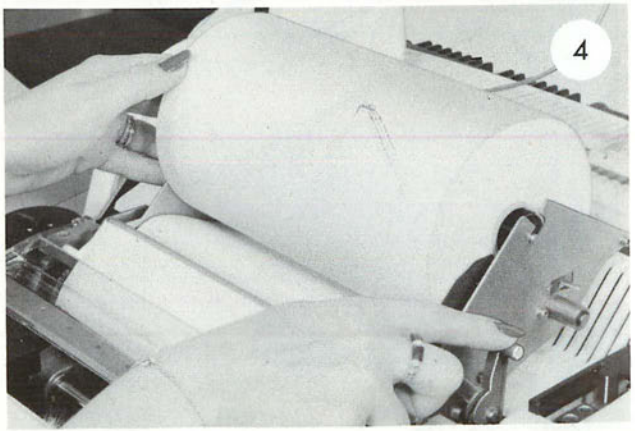
Depress LOCAL key, related indicator light goes out.

Your unit is now on STAND BY.

When the cover lid is opened, you can also advance the paper with a knurled knob which is located to the right of the roller.

NOTE : If you receive a call during these operations, another audio signal is available. You can stop it after about six seconds by depressing the [⊠] RESET ALARM key.



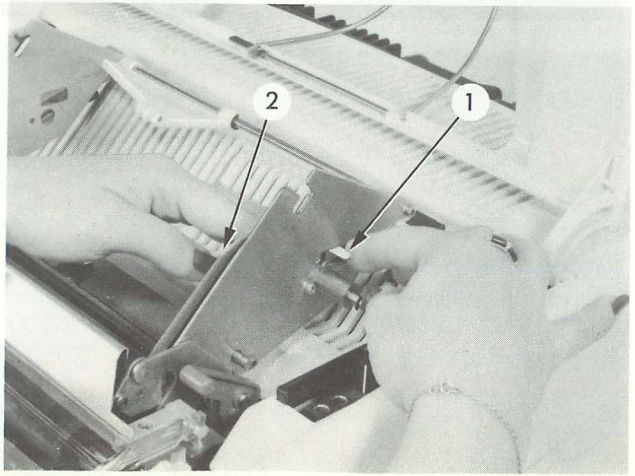


how to change the paper width ?

An adjustment device provides for changing the width of the paper guide to either 210 or 216 mm.

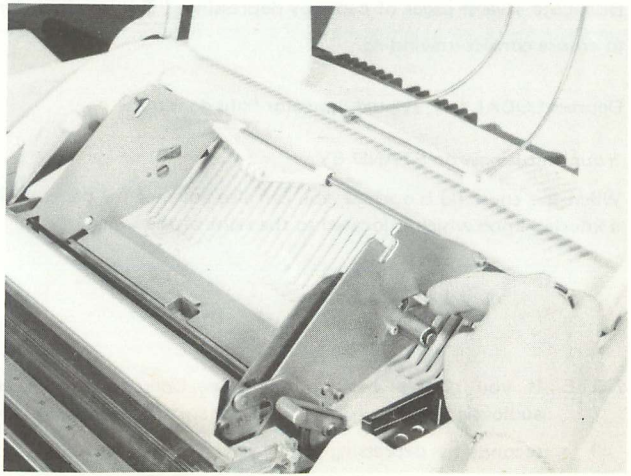
216mm paper width

With the roll removed, simultaneously carry out the two following operations : pull lever (1) up, and push end plate (2) to the right, in its middle, until it locks. A distinct click can be heard

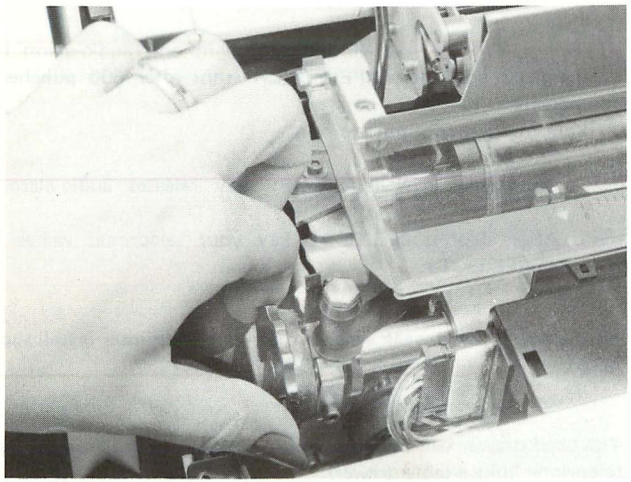


210mm paper width

With roller removed, pull lever (1) up. The end plate (2) moves and locks automatically.

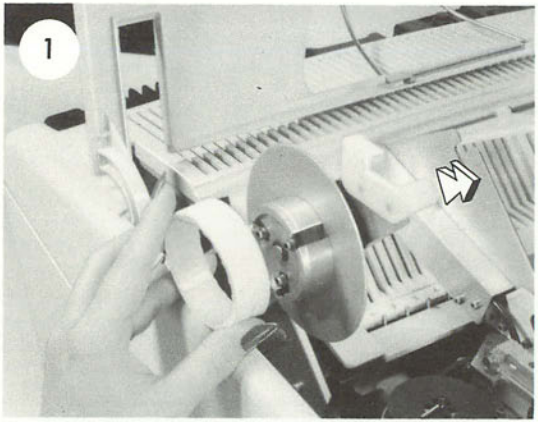


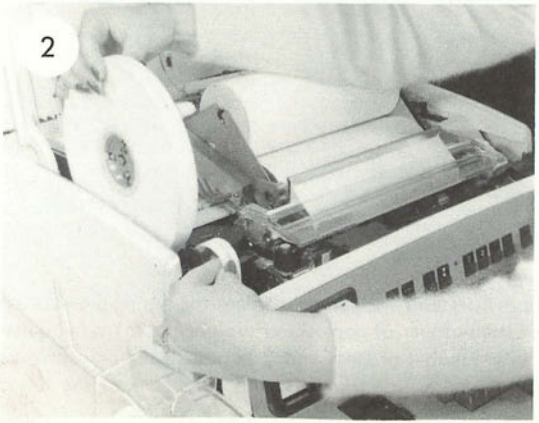
how to adjust typing pressure ?



A device provides you with an adjustment for typing pressure as a funtion of the number of copies and type of paper that you have selected. (Maximum : original and 3 copies). This adjustment is provided with the knurled knob which is located to the left of the unit.

22 replacing a roll of tape on your teleprinter





WHEN ? Your teleprinter signals the end of tape as follows :

- during message preparation (LOCAL indicator light on), PUNCH ON/OFF indicator light blinks and UNBLOCK KEYB. light comes on.

  – The KEYBOARD is blocked. Nevertheless you can end message after depressing the UNBLOCK KEYB. key.

  – The READER stops. Nevertheless you can end your message after depressing the READER ON/OFF key.

  After 600 punched characters, the teleprinter writes you : «TAPE OUT». Indicator lights LOCAL and PUNCH ON/OFF extinguish.

- during a message (LINE indicator light on), audio-alarm is energized and the TAPE PUNCH stops after 600 punched characters.
  Your message continues to print.

  – Depressing PUNCH ON/OFF key releases audio-alarm,

  – After depressing LOCAL key your teleprinter writes : «TAPE OUT».

At the end of each week, ensure that your teleprinter is well supplied.

The chad drawer can be removed by sliding it to the front of the teleprinter (like a table drawer).

HOW ? After having raised the cover lid, carry out steps as shown in the photos :

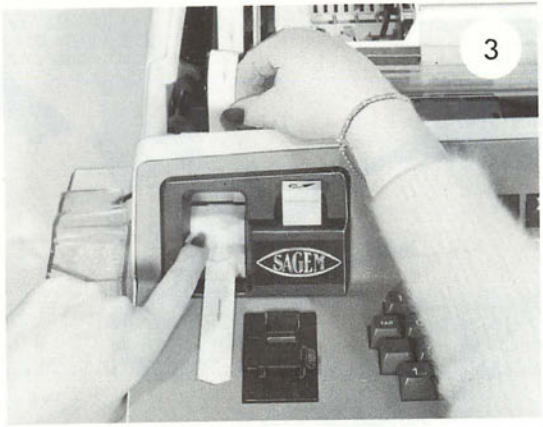
1 pull tape support completely towards you, then disengage the used roll,

2 install a new roll in such a way that the tape unwinds up and towards you. Insert the tape under the tape tension lever (see threading diagram on the cover) then press the support to the stop,

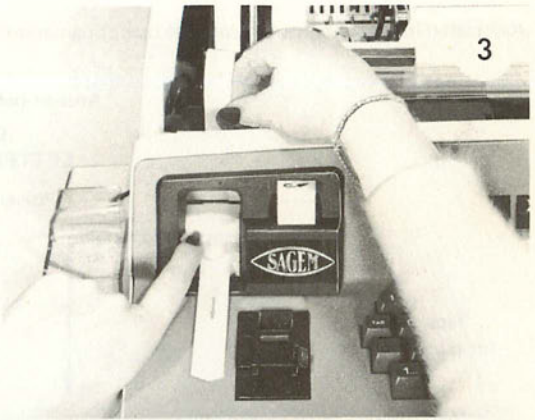
3 release the punch tape pressure plate and insert the tape until it passes completely through,

4 depress tape pressure plate until it locks. A distinct click can be heard,

5 depress RUN-OUT key in order to check the correct threading.



Note. Before performing this loading operation, ensure the tape threading is free from residual paper.



HOW ? After having raised the cover lid, carry out steps as shown in the photos :

1 - cut the tape above the TAPE PUNCH,
- depress RUN OUT key until complete tape disengagement,
- pull tape support completely towards you, then disengage the used roll,

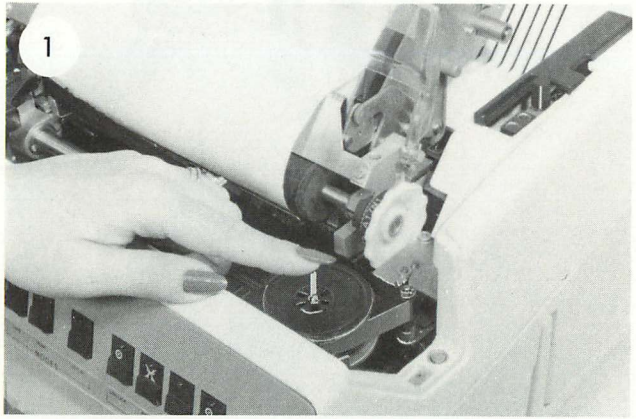
2 install a new roll in such a way that the tape unwinds up and towards you. Insert the tape under the tape tension lever (see threading diagram on the cover) then press the support to the stop,

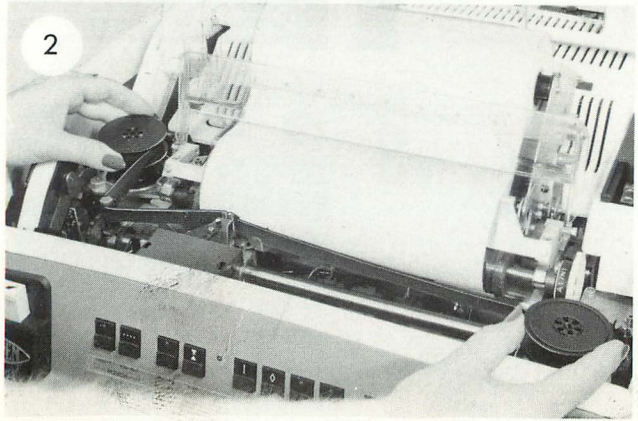
3 release the PUNCH tape pressure plate (red mark visible) and insert the tape until it passes freely through,

4 depress tape pressure plate until it locks. A distinct click can be heard (red mark not visible),

5 depress RUN-OUT key in order to check the correct threading.

24 replacing the ink ribbon on your teleprinter





WHEN ? — When you think that the characters are too faded.

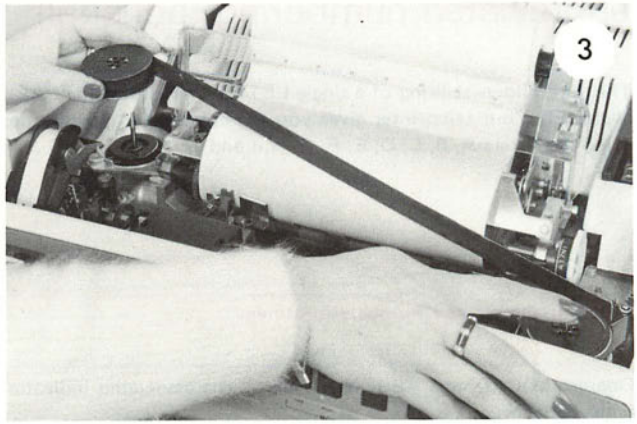
— At the end of the week ensure that your teleprinter is well supplied.

HOW ? — Set POWER ON/OFF switch to «OFF». POWER indicator light goes out.

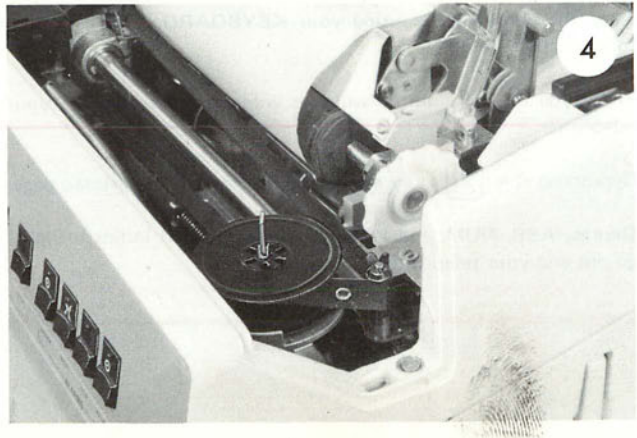
— Follow the steps in the photos.

1 raise the paper cutter and reel locks.

2 remove reels and used ribbon.



3 position reels with new ribbon (refer to installation diagram under the cover).



4 install on their supports , first the RH reel then the LH reel.
CAUTION : Pay careful attention to this order of installation.

Insert the ribbon in the ribbon guide with the eyelet positioned as shown in the photo. Then, fold back the paper cutter.

particular devices

abbreviated numbering (optional)

This unit allows striking of a single LETTER instead of the CALL NUMBER. Your teleprinter gives you ten abbreviated possibilities using the letters A, B, C, D, E, F, G, H, I and J.

Entering abbreviated numbers in storage

Depress LOCAL and ABB. NUM. keys ; the associated indicator lights come on.

Type the chosen letter using your KEYBOARD. This is printed followed by a colon :

Then type the call number which is entered into storage by your teleprinter.

Depressing the [Z] key allows verification on the printed page.

Depress ABB. NUM. and LOCAL. The associated indicator lights go out and your teleprinter is ou STAND BY.

automatic end of message (optional)

This unit is used when transmitting a message using the READER. It is placed into operation by depressing the AUTO CLEAR key.

When the tape reader is finished the unit ends the message and automatically switches to STAND BY.

Indicator lights READER ON/OFF, LINE and AUTO CLEAR go out.

tabulation

This device allows to achieve tables or lists. The tabulated positions have identical steps of 5 characters from the beginning of the line.

This function is performed by depressing [TAB] key located on the KEYBOARD.

Erratum 26
(continuation)

tabulation

This device allows to achieve tables or lists. The tabulated positions have identical steps of 5 characters from the beginning of the line.

This function is performed by depressing [TAB] key located on the KEYBOARD.

automatic end of message (optional)

This unit is used when transmitting a message using the READER. It is placed into operation by depressing the AUTO CLEAR key.

When the tape reader is finished the unit ends the message and automatically switches to STAND BY.

Indicator lights READER ON/OFF, LINE and AUTO CLEAR go out.

Note - In some equipments this function is performed by depressing (8) key.

transmission of cyphered texts (optional)

Note - This option allows the transmission of texts recorded on punched tape, and previously cyphered.

The equipment being ready to send, wether using the keyboard (see page 7), or the reader (see page 14),

- the changing to the "Transmission of cyphered texts" mode is realized :
  - by depressing (12) key,
  - by transmitting, using the keyboard or the reader, the significant sequence,
  - by receiving the same sequence.

  Example of sequence : S, S, S, S

  (12) key indicator light comes on.
- the return to normal mode is realized in the same way that above - mentioned.

  Example of sequence : N, N, N, N, Letter, Letter

  (12) key indicator light goes out.

Erratum

abbreviated numbering (optional)

This unit allows striking of a single LETTER instead of the CALL NUMBER. Your teleprinter gives you sixteen abbreviated possibilities using the letters A, B, C, D, E, F, G, H, I, J, K, L, M, N, O and P.

ENTERING ABBREVIATED NUMBERS IN STORAGE

Depress LOCAL and ABB. NUM. (or (8)) keys ; the associated indicator lights come on.

- **National number**

  Type the chosen letter using your KEYBOARD. This is printed followed by a colon :

  Type the call number, then depress [⟵] key.
  Example : A : 610762
  The call number is entered into storage by your teleprinter.

  Depressing the [Z] key allows verification on the printed page.

  Depress ABB. NUM. (or (8)) and LOCAL keys. The associated indicator lights go out and your teleprinter is on STAND BY.

- **International number**

  Number preceded of a prefix (or battery number).

  Proceed as specified by entering the prefix number after the chosen letter, followed imperatively by the sign / and after another letter, the call number followed by +.
  Example : C : 046000 /
  F : 21605 +

MESSAGE TRANSMISSION USING THE ABBREVIATED NUMBERING

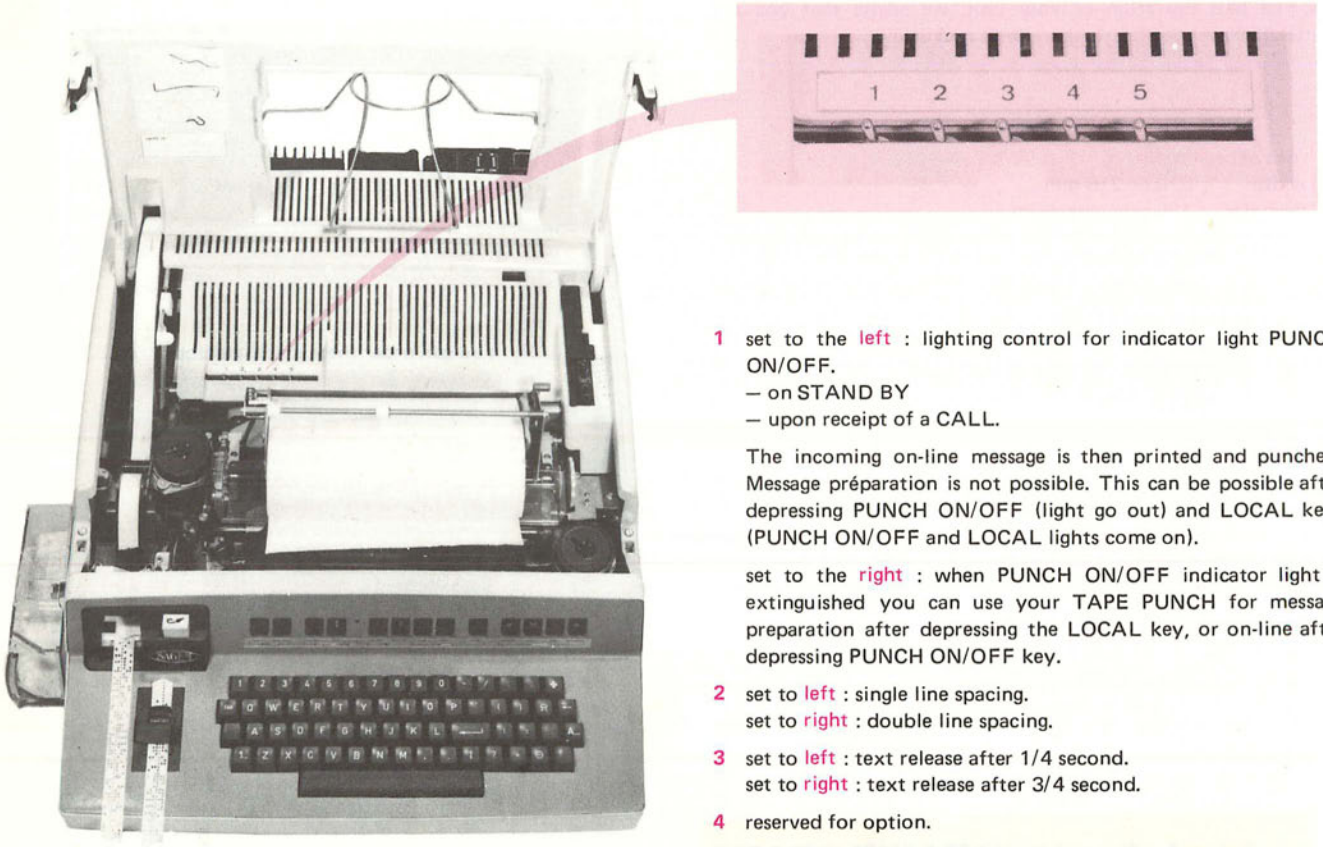
- **National call**

  After being on line, type the letter corresponding to the number of the addressee (example : A)
  The TX 20 automatically sends 610762 as above.

- **International call**

  After being on line, type the letter corresponding to the prefix (example : C).
  The TX 20 sends 046000 as above.
  After receiving the «Invitation to number» signal (G.A.), type the letter corresponding to the number of the addressee (example : F).
  The TX 20 sends 21605 as above.
  The number of the addressee can also be sent normally from the keyboard.

possible choices



1 set to the left : lighting control for indicator light PUNCH ON/OFF.
– on STAND BY
– upon receipt of a CALL.

The incoming on-line message is then printed and punched. Message préparation is not possible. This can be possible after depressing PUNCH ON/OFF (light go out) and LOCAL keys (PUNCH ON/OFF and LOCAL lights come on).

set to the right : when PUNCH ON/OFF indicator light is extinguished you can use your TAPE PUNCH for message preparation after depressing the LOCAL key, or on-line after depressing PUNCH ON/OFF key.

2 set to left : single line spacing.
set to right : double line spacing.

3 set to left : text release after 1/4 second.
set to right : text release after 3/4 second.

4 reserved for option.

5 reserved for option.

28 expendable material

For the best operation of your unit, we advise that you use material whose specifications are indicated below :

- rolls of page paper
  width : 210 or 216 mm
  diameter : 120 mm maximum
  quality : AFNOR standard NFQ 11-002
  original : 56 to 64 g/m2
  copies : 20 to 30 g/m2
  carbon : 17 g/m2
  or self-carbon paper : 56 to 64 g/m2

- 5-unit tape
  width : 17.4 mm
  standard : DIN 66016 BI. 1

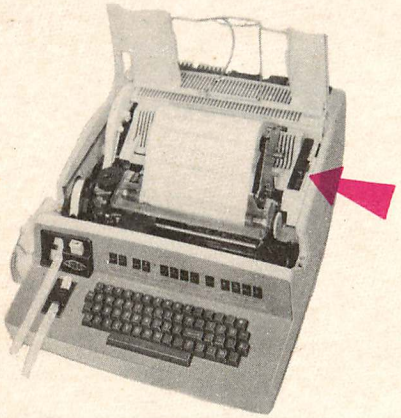
- SAGEM ink ribbon with eyelets
  width : 13 mm
  length : 13 m
  minimum distance of eyelets to the ends : 150 mm
  reel : UNDERWOOD

- cartridge fuse 5 x 20 mm delayed D1TD (HA20)
  — for 220/240V : 0,8A
  — for 110/127V : 1,25A

You can order these materials from :

SAGEM
Département télétransmissions
6, avenue d'Iéna, 75783 PARIS CEDEX 16
Tél. : 745.14.60 - Télex : 610762 F

your teleprinter is in derangement



Are you connected to a telegraphic network ?

Before giving a description of the derangement, ensure first that the maintenance switch (showed by the arrow) is completely turned round to the left.

This switch is for the use of the maintenance technician. Do not operate it except at the request of the maintenance service.

WARNING : In operation defect case, set ON/OFF switch to OFF, then to ON position. If the defect persists, call the maintenance service.

Crypto Museum
www.cryptomuseum.com
CM 302882

Société d'Applications Générales d'Electricité et de Mécanique

SAGEM

UNE SOCIETE G3S

SA 9004 Printed in France

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S.A. CAPITAL : 66 000 000 F
TELEX : 610762F — CABLES : TELESAGEM PARIS — 562082909 B R.C.PARIS